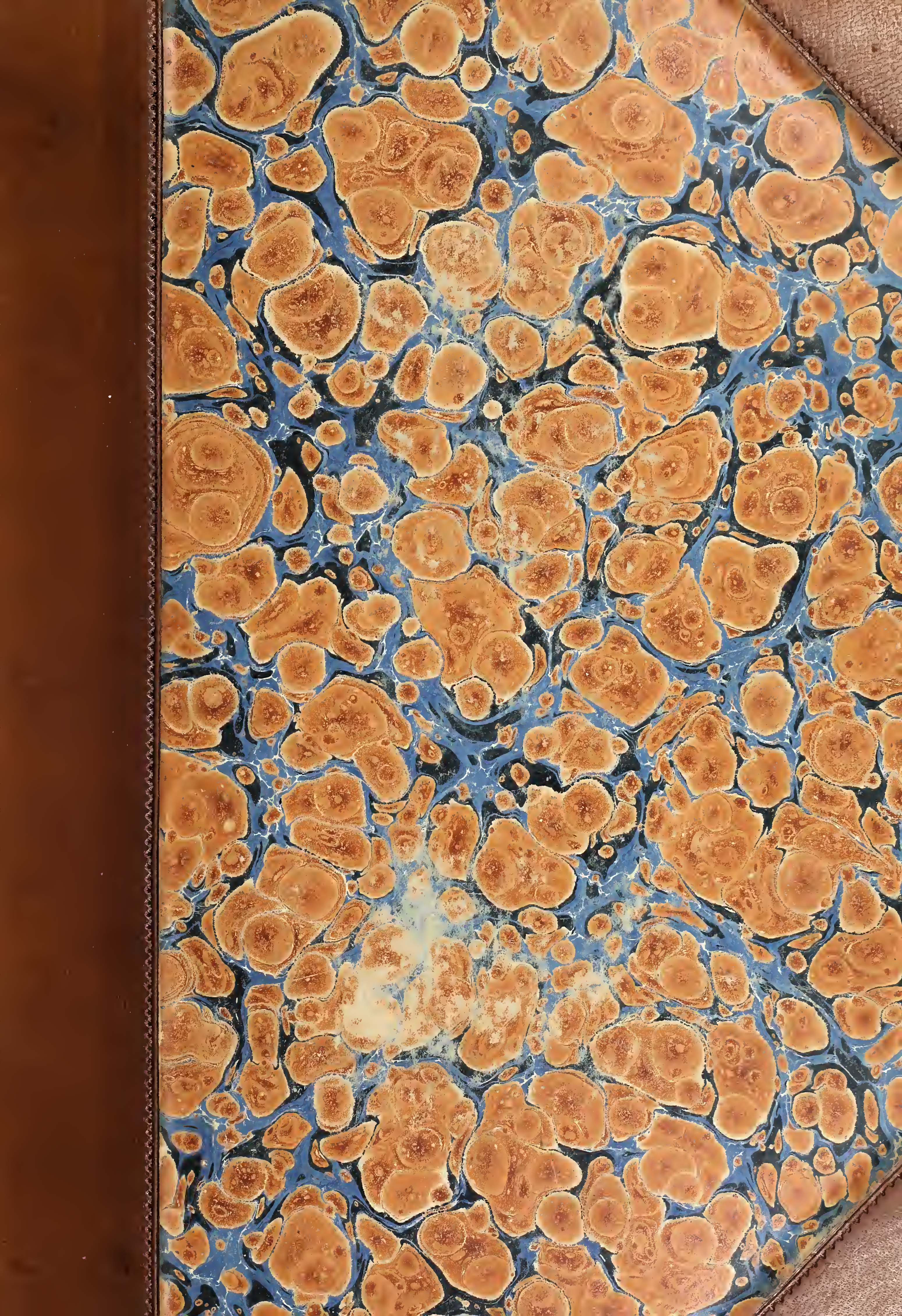

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FOR THE YEAR 1896.

VOL. 188.

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  - AB. Johns Hopkins University.
- Berkeley.
  - *p.* University of California.

United States (continued).

- Boston.
  - AB. American Academy of Sciences.
  - B. Boston Society of Natural History.
  - A. Technological Institute.
- Brooklyn.
  - AB. Brooklyn Library.
- Cambridge.
  - AB. Harvard University.
  - B. Museum of Comparative Zoology.
- Chapel Hill (N.C.).
  - *p.* Elisha Mitchell Scientific Society.
- Charleston.
  - *p.* Elliott Society of Science and Art of South Carolina.
- Chicago.
  - AB. Academy of Sciences.
  - *p.* Journal of Comparative Neurology.
- Davenport (Iowa).
  - *p.* Academy of Natural Sciences.
- Ithaca (N.Y.).
  - *p.* Physical Review (Cornell University).
- Madison.
  - *p.* Wisconsin Academy of Sciences.
- Mount Hamilton (California).
  - A. Lick Observatory.
- New Haven (Conn.).
  - AB. American Journal of Science.
  - AB. Connecticut Academy of Arts and Sciences.
- New York.
  - *p.* American Geographical Society.
  - *p.* American Museum of Natural History.
  - *p.* New York Academy of Sciences.
  - *p.* New York Medical Journal.
  - *p.* School of Mines, Columbia College.
- Philadelphia.
  - AB. Academy of Natural Sciences.
  - AB. American Philosophical Society.
  - *p.* Franklin Institute.
  - *p.* Wagner Free Institute of Science.
- Rochester (N.Y.).
  - *p.* Academy of Science.
- St. Louis.
  - *p.* Academy of Science.
- Salem (Mass.).
  - *p.* American Association for the Advancement of Science.
  - AB. Essex Institute.
- San Francisco.
  - AB. California Academy of Sciences.

United States (continued).

Washington.

- AB. Patent Office.
- AB. Smithsonian Institution.
- AB. United States Coast Survey.
- B. United States Commission of Fish and Fisheries.
- AB. United States Geological Survey.
- AB. United States Naval Observatory.
- *p*. United States Department of Agriculture.
- A. United States Department of Agriculture (Weather Bureau).

West Point (N.Y.)

- AB. United States Military Academy.

ADJUDICATION of the MEDALS of the ROYAL SOCIETY for the year 1895, by the PRESIDENT and COUNCIL.

The COPLEY MEDAL to KARL WEIERSTRASS, For.Mem.R.S., for his Investigations in Pure Mathematics.

A ROYAL MEDAL to JAMES ALFRED EWING, F.R.S., for his Investigations on Magnetic Induction in Iron and other Metals.

A ROYAL MEDAL to JOHN MURRAY, for his services to Biological Science and Oceanography in connection with the "Challenger" Reports, and for his Original Contributions to the same.

The DAVY MEDAL to WILLIAM RAMSAY, F.R.S., for his share in the Discovery of Argon, and for his Discoveries regarding Gaseous Constituents of Terrestrial Minerals.

The Bakerian Lecture (1895), "On the Laws of Connexion between the Conditions of a Chemical Change and its Amount.—III. Further Researches on the Reaction of Hydrogen Dioxide and Hydrogen Iodide," was delivered by A. VERNON HARCOURT, F.R.S., and WILLIAM ESSON, F.R.S.

The Croonian Lecture (1895), "On the Nature of Muscular Contraction," was delivered by Professor T. W. ENGELMANN.

CONTENTS.

(A)

VOL. 188.

A Magnetic Survey of the British Isles for the Epoch January 1, 1891. *By* A. W. Rücker, *M.A., F.R.S., and* T. E. Thorpe, *D.Sc., LL.D., F.R.S.* . . page 1

ILLUSTRATIONS.

Plates 1 to 14.—Messrs. A. W. Rücker and T. E. Thorpe on a Magnetic Survey of the British Isles for the Epoch January 1, 1891.

INDEX SLIP.

RÜCKER, A. W., and THORPE, T. E.—A Magnetic Survey of the British Isles for the Epoch January 1, 1891.
Phil. Trans. A 1896, vol. 188, pp. 1–661.

THORPE, T. E., and RÜCKER, A. W.—A Magnetic Survey of the British Isles for the Epoch January 1, 1891.
Phil. Trans. A 1896, vol. 188, pp. 1–661.

Anticlinal Axes, Magnetic Disturbances near.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 656.

England and Wales, Local and Regional Magnetic Disturbances in.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 522, &c.

Faults, Magnetic Disturbances near Geological.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 655.

Geology of Great Britain and Ireland, Relation between Local Magnetic Disturbances in and the.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 637, &c.

Igneous Rocks Theory of Magnetic Disturbances caused by.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 639, &c.

Igneous Rocks, Local Magnetic Disturbances in Great Britain and Ireland near.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 641, &c.

Ireland, Local and Regional Magnetic Disturbances in.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 522, &c.

Isomagnetic Lines, Accuracy attained in the delineation of.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 538, &c.

Isomagnetic Lines, Method of determining from observations.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 504. &c.

Magnetic Disturbances (Local and Regional) in Great Britain and Ireland.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 522, &c.

Magnetic Disturbing Forces (Local and Regional), Accuracy attained in the determination of.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 538, &c.

Magnetic Instruments Errors and comparison of.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 17, &c.

Magnetic Survey of Great Britain and Ireland for the Epoch January 1, 1891. Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, pp. 1–661.

Scotland, Local and Regional Magnetic Disturbances in.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 522, &c.

Secular Change in Magnetic Elements in Great Britain and Ireland between 1886 and 1891.
Rücker and Thorpe. Phil. Trans. A 1896, vol. 188, p. 523, &c.

A Magnetic Survey of the British Isles for the Epoch January 1, 1891.

By A. W. RÜCKER, *M.A., F.R.S., and* T. E. THORPE, *D.Sc., LL.D., F.R.S.*

Received June 21,—Read June 21, 1894.

[PLATES 1–14.]

CONTENTS.

	Page.
Introduction	4
Organization and Staff	6
Observers	6
Computers	6
Epoch of Survey	7
Magnetic Units Employed	7
Instruments	7
Base Station—Kew	8
Survey Standard, 1886	8
Discrepancies of Standard Instruments	8
Reasons for assuming the Kew Standards to be Constant	9
Methods of Correcting for Diurnal Variation and Disturbance used in 1886 and 1891	10
Comparison of Kew and Survey Instruments	12
Declination	12
Table of Corrections to Declinometers	16
Magnitude of the Corrections	16
Horizontal Force	17
Table of Corrections to Magnetometers	23
Dip	23
Reasons why Corrections are Unnecessary	27
Summary of Differences between Kew and Survey Standards	27
Time Signals	27
Selection of Stations	28
Work of the Different Observers	28
Total Number of Stations	29
Total Number of Observations	30
Positions of Stations	30
Method of Taking the Observations	31
Correction and Tabulation of the Observations	31
Table of Values of "P"	32
Errors of Experiment	32
Secular Corrections for the Reduction of the 1891 Survey to Epoch	33

	Page.
Results of the Observations and Descriptions of Stations	34
Calculation of the Isomagnetic Lines	504
The Isogonal Lines	504
Data for the Calculation of the District Lines	505
Declinations Calculated from the District Lines	506
Equations to Terrestrial Isogonals	508
Declinations Calculated from Terrestrial Isogonals	508
Calculated and Observed Values at Central Stations	509
Comparison of District and Terrestrial Isogonals	510
Lines of Equal Horizontal Force	511
Data for the Calculation of the District Lines	511
Horizontal Forces Calculated from the District Lines	512
Equations to Terrestrial Lines of Equal Horizontal Force	514
Horizontal Forces Calculated from Terrestrial Lines	514
Calculated and Observed Values at Central Stations	514
Comparison of District and Terrestrial Lines	515
Isoclinal Lines	516
Data for the Calculation of the District Lines	516
Equations to Terrestrial Isoclinal Lines	516
Dips Calculated from the District Lines	518
Dips Calculated from Terrestrial Lines	520
Calculated and Observed Values at Central Stations	520
Comparison of District and Terrestrial Lines	521
Local and Regional Disturbances Deduced from the 1891 Survey	522
Comparison with 1886 Survey	522
Secular Change between 1886 and 1891	523
(1) Deduced from Central Stations	524
(2) Deduced from Repeat Stations	527
(3) From Magnetic Observatories	529
Table of Secular Change	530
Comparison with Observations	533
Comparison with Conclusions in 1890 Memoir	534
Reduction of the Observations of the 1886 Survey to the Epoch of the New Survey	537
Comparison between the Terrestrial Isomagnetics Obtained from the two Surveys of 1886 and 1891 when Reduced to the same Epoch	538
Final Tables of Calculated Values of the Magnetic Elements for January 1, 1891, Deduced from Both Surveys	544
Comparison of the Vertical Force Disturbances at the Repeat Stations as Deduced from the Two Surveys	546
Similar Comparison of the Directions of the Horizontal Disturbing Forces	549
Comparison of the Isomagnetics Deduced from the 1891 Survey, and from the Mean of the 1886 and 1891 Surveys respectively	552
Local and Regional Disturbances	555
Table of Declinations, Inclinations, Horizontal and Vertical Forces Observed and Calculated with Differences	556
Local and Regional Disturbing Forces Obtained from the two Surveys Separately and Combined	590
Table of the same	590

Page.
Nomenclature and Magnetic Contour Surface 610
    Magnetic Ridge and Valley Lines, Peaks, and Cols 612
General Results of the Survey 613
    Relative Importance of Magnetic Districts 613
    Secondary Ridge Lines 614
    Methods of Drawing Ridge and Valley Lines 615
Magnetic Districts of the United Kingdom 615
    (1) The Great Glen, or Caledonian Canal District 615
    (2) and (3) Cape Wrath and Loch Broome 618
    (4) and (5) North and South Aberdeenshire 619
    (6) Crieff 620
    (7) The Scotch Coal Field and the Cheviots 621
    (8) Galloway 624
    (9) The English Lakes 625
    (10) Lincolnshire and Yorkshire 626
    (11) Derbyshire 628
    (12) North Wales 629
    (13) Mid Wales 630
    (14) Southern England and Wales 630
    (15) The Bristol Channel 632
    (16) Devonshire 632
    (17) Cornwall 632
    (18) Antrim 633
    (19) Mid Ireland 634
    (20) Wexford 636
    (21) Fragmentary Coast Districts 637
On the Relation between the Magnetic and Geological Constitution of the United Kingdom 637
Dykes, Basaltic Sheets, and Isolated Masses of Basalt 639
    Theory of Disturbances 639
    Observations at Kilteely 641
        ,, ,, Cromwell's Hill 642
        ,, ,, Canna 643
        ,, ,, Titterstone Hill 647
        ,, ,, Brent Tor 648
        ,, ,, Builth 648
        ,, ,, Barmouth 648
Basaltic Districts 649
    Antrim 650
    Mid-Scotland 652
    Skye and Mull 652
    North Wales 652
    Devonshire and Cornwall 653
    Wexford and Wicklow 653
    Donegal 653
    Pembrokeshire 653
    Limerick 653
    Summary of Results 653

	Page.
Non-Basic Igneous Rocks	653
The Cheviots and Berwickshire	654
Galway	655
Faults	655
Regions of Upheaval	656
General Summary	658
Future Applications of the Results of the Survey	659
Errata in the "1890 Memoir"	660

LIST OF MAPS.

No. 1. Isogonals for the Epoch Jan. 1, 1891.
,, 2. Lines of Equal Horizontal Force for the Epoch Jan. 1, 1891.
,, 3. Isoclinals for the Epoch Jan. 1, 1891.
,, 4. Comparison of the Principal Regions of Magnetic Attraction in the United Kingdom as indicated by the Surveys of 1886 and 1891.
,, 5. Declinations and true Isogonals for the Epoch.
,, 6. Horizontal Forces and true Lines of Equal Horizontal Force for the Epoch.
,, 7. Dips and true Isoclinals for the Epoch.
,, 8. Vertical forces and true Lines of Equal Vertical Force for the Epoch.
,, 9. Differences between the Observed and Calculated Values of the Declinations.
,, 10. Differences between the Observed and Calculated Values of the Horizontal Forces.
,, 11. Differences between the Observed and Calculated Values of the Dips.
,, 12. Differences between the Observed and Calculated Values of the Vertical Forces with Magnetic Ridge and Valley Lines.
,, 13. Directions of Horizontal Disturbing Forces with corrected Ridge Lines.
,, 14. Relations between Magnetic Disturbances and Geological Phenomena.

INTRODUCTION.

FIVE years ago we communicated to the Royal Society an account of a Magnetic Survey of the British Isles, for the epoch Jan. 1, 1886 ('Phil. Trans.,' vol. 181 (1890), A, pp. 53–328).*

The necessary observations had been made by ourselves at 205 stations during the years 1884–88. The results were worked up in a manner which was, we believe, in some respects novel. The forms of the normal terrestrial isomagnetics—*i.e.*, the lines of equal Declination, Force, and Dip, as they would be if unaffected by local disturbance —were determined, and equations were found connecting the normal magnetic elements at any place with its geographical position. From these the undisturbed values at our stations were deduced, and by comparing them with the results of the observations, it was possible to calculate for each place the magnitude and direction of the horizontal and vertical components of the disturbing magnetic forces, regarded as acting on the north pole of a magnet.

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* NOTE.—As we shall frequently have to refer to this paper, we shall cite it by the short title of "the 1890 Memoir," or "Mem., 1890."

When these were graphically represented on maps it was found that the Horizontal Disturbing Forces tended towards the regions of greatest Vertical Force, and that it was possible to divide the United Kingdom into a comparatively small number of districts in each of which the north pole of a needle was urged horizontally towards a region or line (called by us a *ridge* line) on or near to which the downward Vertical Disturbing Force was a maximum.

In several cases these ridge lines were obviously connected with some geological feature of the country through which they passed ; and notably either with masses of basic rocks, or with places where the older rocks were known to approach relatively near to the surface.

In 1889 we undertook two supplementary surveys. We had expressed the opinions that a centre of magnetic attraction existed out at sea, to the west of Skye and Mull, and that a well-marked locus of magnetic attraction ran through districts in Yorkshire and Lincolnshire, in which there was nothing in the nature of the superficial rocks to account for the phenomena. ("Mem.," 90, pp. 300, 307, 312.)

These conclusions were tested and verified by a number of new observations. They will be dealt with hereafter, but the leading facts of the confirmation of our predictions were communicated to the Royal Society in 1890 ('Proc. Roy. Soc.,' vol. 47, p. 444, 1890).

It was then determined to carry out the survey in greater detail, so that the positions of the ridge lines which we had discovered could be laid down more accurately. It was important that this should be done, in order that any shift or change in their positions should be detected as soon as possible.

Such an extension of the survey involved the addition of a great number of new stations. It was desirable that the observations should be made within a short time, both to avoid the complications introduced by the application of the correction for secular change over a long interval, and also because the period of maximum sun spot frequency was approaching, during which the work would probably be interfered with by magnetic storms.

A liberal allowance by the Royal Society from the Government Grant Fund enabled us to carry on the survey with the requisite speed, and on an extended scale, by the aid of assistants. We hope that the present communication will show that, as the result of our work, the main magnetic features of the United Kingdom are now known with such accuracy that, if they are permanent, little remains to be done but to fill in details ; while, if they are subject to change, it will be comparatively easy to detect and measure the alterations.

Organization and Staff.

All the gentlemen who have aided us in the extension of our original survey have been selected either from among the Assistants in the Royal College of Science, London, or from among those who have gained the Associateship of the same College.

In 1890 we appointed Messrs. A. E. **Briscoe**, B.Sc., and P. L. **Gray**, B.Sc., to aid us in the work of observation. Mr. **Briscoe** resigned his appointment at the end of that year, and was succeeded by Mr. W. **Watson**, B.Sc., who, with Mr. **Gray**, worked in the field during the summers of 1891 and 1892.

Each of these gentlemen, having been instructed in the use of the instruments and methods of reduction, made a series of test observations at Kew, and then undertook a short preliminary tour, the results obtained in which were at once completely reduced, so that their accuracy could be tested. Having passed satisfactorily through this course of training, the observers entered upon prolonged courses of field work, extending, in 1891 and 1892, over the six summer months. The figures given hereafter prove that their observations were of the most trustworthy character, and attained a very high standard of accuracy.

The work of reducing the observations made, generally in duplicate, and frequently in triplicate, at many hundreds of stations, was very heavy. The observers took a leading part in this, but we also organized a small body of computers, by whose aid the task of reduction was as far as possible completed very shortly after the observations were made. The method adopted was as follows :—

The observers always reduced their observations within a day or two, and forwarded them to one of the staff of computers, who verified the calculations and made a fair copy. In the autumn, when the field work for the season was completed, the observers checked the accuracy of any alterations which had been made in their original calculations by the computers, and the observations made at some of the stations were reduced, *de novo*, either by Professor **Rücker** or by Messrs. **Gray** and **Watson**, to make sure that no error affected a whole series of reductions.

The value of "P" in the formula for the horizontal force was then found, and the corrections for magnetic disturbances were applied by means of the curves obtained from the Kew self-registering instruments.

Every step in the calculations was checked by an independent computer, and we believe that no errors of any importance have escaped detection. The equations to the iso-magnetic lines were determined by Professor **Rücker**, but the heavy work of testing and applying them was performed entirely by Messrs. **Gray** and **Watson**. These gentlemen have done the work assigned to them, both as observers and as computers, with great ability, energy, and zeal, and our hearty thanks are due to them for the faithfulness, patience, and scientific skill with which they have assisted us.

Epoch.

The epoch of the survey is January 1, 1891, to which date all the observations made have been reduced.

Magnetic Units.

In our previous survey we employed metric units in which the value of H in the south of England is about 1·8, the decimal place in the expression for a magnetic force being one place further to the right than in the C.G.S. system, in which $H = 0{\cdot}18$ (about). At that date the metric system was in use both at Greenwich and Kew. There is no doubt that in future C.G.S. units will be almost exclusively employed, but it would obviously be inconvenient to use two systems in two papers so closely related as this and our previous memoir.

We therefore adhere to the metric system, but wherever doubt is likely to arise, we either draw attention to the fact, or give the value of the quantity under discussion in both systems.

Instruments.

The instruments used were four Kew-pattern Magnetometers, by ELLIOTT BROS., viz., Nos. 60, 61, 70, 73. Of these, 60 and 61 had been used in our earlier survey by Professors RÜCKER and THORPE respectively, and as their constants were well known they were assigned to the assistants. Nos. 61 and 70 belong to the Department of Science and Art. No. 73 was purchased out of the Royal Society grant.

No. 60 was used throughout by Mr. GRAY, No. 61 in 1890 by Mr. BRISCOE, and thereafter by Dr. THORPE.

No. 70 was used by Professors RÜCKER and THORPE in 1890, and by Mr. WATSON in 1891 and 1892.

No. 73 was used by Professor RÜCKER in 1892.

Four Dip Circles were also employed, all of which were made by DOVER, of Charlton, in Kent.

Nos. 74 and 83 were used in the original survey. Of these, No. 74 was employed by Mr. GRAY in the years 1890, 91, 92. During the summer of 1892 Needle No. 2 was injured and Needle No. 1 of Dip Circle 83 was sent to Mr. Gray. A new needle was then made to replace the injured one and was therefore used with Dip Circle 83, being called No. 3.

Dip Circle 83 was used by Mr. BRISCOE in 1890 with Needles 1 and 2, and by Dr. THORPE in 1892 with Needles 2 and 3.

Of the two new circles, No. 94 was used by Professors RÜCKER and THORPE in 1890 and by Mr. WATSON in 1891–92.

No. 99 was used by Dr. THORPE in 1891 and by Professor RÜCKER in 1892.

Base Station.

As before, our base station is the Kew Observatory, and we must once more express our great obligations to the Kew Committee of the Royal Society, to the late Mr. G. M. WHIPPLE, the Superintendent, and to Mr. T. BAKER, the first Assistant in the Observatory, for their cordial co-operation in our work. As a greater number of observers and more instruments were employed than in our original survey, the demands we were compelled to make upon the time and attention of the officers of the Observatory were much larger than during the progress of our earlier work.

The instruments used in the 1886 survey were found at that time to be in close accord with each other, though the results differed to an appreciable extent from those given by the standard instruments at Kew. ("Mem.," 90, pp. 58–59.)

Our instruments were of recent construction and were themselves in agreement, so that the absolute values given by them were at least as trustworthy as those furnished by the older Kew standards. The observations made at the Observatory were important, not as comparisons with an absolute standard, but as tests of the constancy of the survey instruments during the period of the survey.

As no change was detected, it was not considered necessary to apply to the observations the constant corrections, which would have been required to reduce them to exact conformity with Kew.

Thus on the average in our earlier survey :—

(1.) The Declinations were 2′·5 less.

(2.) The Horizontal Forces were 0·0029 metric or 0·00029 C.G.S. unit greater ; and

(3.) The Dips were 2′·7 less* than if they had been measured with the Kew instruments.

We have, therefore, had to consider whether it was desirable to adhere to this *Survey Standard.*

Evidence is accumulating that the differences between the results given by so-called absolute instruments for the measurement of the magnetic elements are considerable. Our own experience shows that instruments of the same pattern are not in exact accord. They differ from each other and they differ from Kew.

Dr. VAN RIJCKEVORSEL has recently compared the absolute instruments at several of the chief European magnetic observatories by carrying the same magnetometer from place to place. He found that the differences between them far exceeded mere errors of observation.

An inquiry into the cause of these discrepancies is desirable, but it was not essential for our immediate purpose, provided that our instruments were frequently compared.

We have, therefore, been obliged to content ourselves with recording a few observations which may hereafter be useful, and, as the Kew values of the magnetic elements do not appear to have any special claim to the title of "absolute," we have reduced all our observations to the Survey Standard, which we previously employed.

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* In the case of the dip this apparent difference has since been accounted for, see p. 23 below.

We have accepted without question the tables of corrections for temperature, &c., supplied with the magnetometers, on the authority of the Kew Observatory. There is no reason to doubt their accuracy, but, if our main object had been to explain the discrepancies between the instruments, a full investigation of the correction tables would have been necessary.

Before discussing the methods of comparison in detail, we may remark that much of the earlier part of this paper is taken up with an investigation of the corrections necessary to make all the different parts of our work strictly comparable. These are not always small, but we believe that the precautions we have taken have left no residual errors of importance. The agreement between neighbouring stations as to the magnitude and direction of the Disturbing Forces, even where those forces are so small that the results are of the same order as the error of experiment, is so remarkable that it is impossible that they can be affected with any serious inaccuracy.

The corrections to be applied to our instruments to bring them to the common Survey Standard have been determined by frequent comparisons at Kew.

Measurements have been made with them at the Observatory, and the results compared with the values of the elements at the time of observation as given by the self-recording instruments.

These experiments proved that the differences between the Kew and survey magnetometers altered from time to time. This may have been due to changes in the standards, but we have no hesitation in adopting the view that the cause of the variability must rather be sought for in the instruments employed in the field.

The indications of magnetometers 60 and 61, which were certainly constant between 1884 and 1888, appear of late to have changed.

This is probably due to the fact that as the corrections to these instruments were best known, we thought it desirable that the greater number of the observations required for the new survey should be made with them, and therefore assigned them to the assistant observers. They have thus, for three years, been in daily use throughout the six summer months, have travelled many hundreds of miles by train and by carriage, often, in the latter case, over rough country roads, and have necessarily been exposed to the vicissitudes of the weather. Even when all possible care is taken, it is probable that under such circumstances the results would be slightly modified, and such has apparently been the case. In this connection the following points deserve attention.

The difference between the Declinations given by the survey magnetometers 60 and 61, and the Kew instrument was about 2′·5 up to 1887, and was less than 0′·5 in

1890. In the latter year the magnet in use at Kew was changed, but during the whole of that year both the old and the new magnets were used and the comparison thus carried out showed that they were in accord.

Another argument also points to the conclusion that the Kew Standard had not altered.

The average annual secular change of Declination between the years 1886–91 was

— 6′·2 at Greenwich;
— 5′·9 at Kew according to the Observatory instruments;
— 5′·4 ,, ,, ,, survey instruments.

Hence the difference between the Declinations at the two Observatories altered during the five years 1886–91 by 1′·5 according to the Observatory instruments, and by no less than 4′·0 according to the survey instruments. Although we are not prepared to deny that such a variation in the secular change is possible, yet in the present state of our knowledge we think that the preference should be given to that result which brings two such closely neighbouring stations as Greenwich and Kew most nearly into accord.

Two slight modifications were introduced into our method of correcting the indications of the Kew absolute instruments for diurnal variation and disturbance.

In the first place the normal curve of diurnal variation is now determined both at Kew and Greenwich from the traces of the self-registering instruments on quiet days selected by the Astronomer Royal. We have adopted the same plan.

Again, during our earlier survey, the corrections were supplied to us by the Kew officials. The curves given by the self-registering instruments were then standardized by taking the mean of the differences between their indications and those of the absolute instruments for the whole year. Since that time the number of comparisons between the two, carried out in each year, has been much increased, measurements being now made with the absolute instruments four or five times per month.

Hence, it is possible to get a new base line—*i.e.*, to standardize the self-registering instruments—every month, and this plan has been adopted in our recent work.

It was of course important to prove that this slight modification in our method was not the cause of the apparent change in the relations between the Kew and the survey instruments. Although therefore the number of absolute determinations made at Kew in each month was not—at the date of our 1886 survey—sufficient to give the base line for the month with all the certainty that could be desired, we repeated the calculations required to correct the 1886 observations, determining the monthly base line as best we could, with the somewhat meagre data at our disposal.

In the case of the Dips, either this change in the method of reduction or another referred to hereafter, or both combined, abolished the apparent difference between our instruments and that in use at Kew. This point is discussed later.

In the case of the Declinations and Horizontal Forces the more satisfactory result was reached that our earlier conclusions would not have been substantially altered if the plan now adopted had then been used.

The only occasion on which any noteworthy difference would have been produced in the Declinations, was in the case of two observations made with magnetometer 60 on September 30, 1887.

It will be noticed, on referring to our previous Table ("Mem.," 90, p. 58) that the two values of the difference between Kew and No. 60 found on that day were 4′·3 and 3′·9, which do not agree well with the mean, viz., 2′·5. If the correction for the month is applied, these figures are much improved, but our confidence in the improvement is shaken by the fact that just at that time the position of the base-line of the Kew curves was altering very rapidly. Thus the number to be added to the readings of the self-registering instruments to reduce them to absolute measure was :—

− 74′·9 in September, 1887
− 72′·4 „ October, „
− 69′·3 „ November, „

It is therefore very doubtful what value ought to be assumed for September 30.

In spite, however, of these rapid changes, the fact that we made six comparisons, of which two were in September and four in October, enables us to regard the mean of all the results as trustworthy. If we use (1) the monthly values for the base-line given above, or (2) the mean for the Summer half-year for the September observations, and that for the Winter half for October, the final mean results will only differ by − 0′·6 or + 0′·2 from the value obtained by using, in all cases, the mean base-line for the whole year.

On the whole then, we come to the conclusion that there is no evidence that our results are affected by the slight modifications in the method of reduction, and that —as is *primâ facie* most probable—the changes which have taken place must be ascribed to the survey instruments.

We now give the details of the comparisons of the survey instruments with the Kew Standards.

Here and throughout the paper, where initials are used to distinguish between the observers, R., T., G., B., and W. indicate Professor Rücker, Dr. Thorpe, and Messrs. Gray, Briscoe, and Watson, respectively. When Professor Reinold observed with Professor Rücker (*cf.*, p. 28) the initials R. and R. are employed.

The observations with the survey instruments at Kew were made in the Kew Magnetic House.

Comparison at Kew of Declination Observations made with the Survey and Kew Instruments.

As it will be convenient to discuss each magnetic element rather than each instrument separately, we begin by tabulating the Declination Observations.

COMPARISONS of Magnetometer 60 with the Kew Standard Instrument. Observer, Mr. GRAY.

Date.	S (Survey Instrument.)	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′.
June 3, 1890 . .	17° 51′·4	17° 52′·2	+0′·8	17° 51′·9	−0′·5
„ 3, „ . .	17 53·7	17 54·4	+0·7	17 54·1	−0·4
„ 4, „ . .	17 51·2	17 51·5	+0·3	17 51·2	0·0
„ 4, „ . .	17 52·5	17 51·9	−0·6	17 51·6	+0·9
„ 5, „ . .	17 54·7	17 54·9	+0·2	17 54·6	+0·1
„ 5, „ . .	17 55·6	17 56·1	+0·5	17 55·8	−0·2
„ 6, „ . .	17 49·3	17 49·6	+0·3	17 49·3	0·0
			β=+0·3	Mean .	=±0·30
Nov. 12, 1891 . .	17 40·8	17 42·5	+1·7	17 41·9	−1·1
„ 12, „ . .	17 42·9	17 44·3	+1·4	17 43·7	−0·8
„ 18, „ . .	17 45·0	17 45·2	+0·2	17 44·6	+0·4
„ 18, „ . .	17 44·4	17 44·7	+0·3	17 44·1	+0·3
„ 18, „ . .	17 44·8	17 45·1	+0·3	17 44·5	+0·3
„ 18, „ . .	17 44·4	17 45·5	+1·1	17 44·9	−0·5
„ 18, „ . .	17 46·4	17 45·4	−1·0	17 44·8	+1·6
			β=+0·6	Mean .	=±0·71
Oct. 24, 1892 . .	17 36·3	17 36·7	+0·4	17 36·2	+0·1
„ 24, „ . .	17 39·1	17 39·6	+0·5	17 39·1	0·0
„ 25, „ . .	17 36·8	17 37·2	+0·4	17 36·7	+0·1
„ 25, „ . .	17 39·0	17 39·7	+0·7	17 39·2	−0·2
			β=+0·5	Mean .	=±0·10

COMPARISONS of Magnetometer 61 with the Kew Standard Instrument.

Date.	Observer.	S (Survey Instrument).	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′.
June 13, 1890 . .	B.	17° 51′·8	17° 51′·8	0′·0	17° 52′·2	−0′·4
„ 14, „ . . .	B.	17 51·4	17 51·4	0·0	17 51·8	−0·4
„ 17, „ . . .	B.	17 52·4	17 51·4	−1·0	17 51·8	+0·6
„ 17, „ . . .	B.	17 53·2	17 52·4	−0·8	17 52·8	+0·4
„ 18, „ . . .	B.	17 51·7	17 51·6	−0·1	17 52·0	−0·3
„ 18, „ . . .	B.	17 51·9	17 51·4	−0·5	17 51·8	+0·1
				β=−0·4	Mean . . =±0·37	
Nov. 24, 1891 . . .	G.	17 44·0	17 44·8	+0·8	17 44·1	−0·1
„ 24, „ . . .	G.	17 44·8	17 44·8	0·0	17 44·1	+0·7
„ 24, „ . . .	G.	17 43·4	17 43·9	+0·5	17 43·2	+0·2
„ 24, „ . . .	G.	17 42·8	17 43·6	+0·8	17 42·9	−0·1
„ 24, „ . . .	G.	17 42·3	17 43·1	+0·8	17 42·4	−0·1
„ 24, „ . . .	G.	17 42·4	17 43·8	+1·4	17 43·1	−0·7
				β=+0·7	Mean . . =±0·32	
Oct. 20,* 1892 . .	G.	17 40·6	17 37·1	−3·5	17 38·0	+2·6
„ 20, „ . .	G.	17 42·5	17 40·7	−1·8	17 41·6	+0·9
„ 21, „ . .	G.	17 37·2	17 38·7	+1·5	17 39·6	−2·4
„ 21, „ . .	G.	17 41·8	17 41·7	−0·1	17 42·6	−0·8
				β=−0·9	Mean . . =±1·67	

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* The curves given by the self-registering instruments indicated some disturbance.

Comparisons of Magnetometer 70 with the Kew Standard Instrument.
Observer, Mr. Watson.

Date.	S (Survey Instrument.)	K (Kew Instrument.)	K−S=β.	K−β=K′.	S−K′.
April 16, 1891 . .	17° 52′·6	17° 48′·7	−3′·9	17° 52′·3	+0′·3
,, 20, ,, . .	17 49·4	17 45·6	−3·8	17 49·2	+0·2
,, 20, ,, . .	17 52·5	17 48·6	−3·9	17 52·2	+0·3
,, 20, ,, . .	17 56·0	17 53·2	−2·8	17 56·8	−0·8
,, 21, ,, . .	17 52·1	17 47·7	−4·4	17 51·3	+0·8
,, 21, ,, . .	17 47·4	17 43·0	−4·4	17 46·6	+0·8
,, 22, ,, . .	17 51·1	17 47·6	−3·5	17 51·2	−0·1
,, 22, ,, . .	17 48·6	17 45·2	−3·4	17 48·8	−0·2
,, 23, ,, . .	17 52·3	17 48·4	−3·9	17 52·0	+0·3
,, 23, ,, . .	17 48·3	17 44·7	−3·6	17 48·3	0·0
,, 24, ,, . .	17 50·0	17 47·2	−2·8	17 50·8	−0·8
,, 24, ,, . .	17 47·6	17 44·6	−3·0	17 48·2	−0·6
			β=−3·6	Mean .	=±0·43
Oct. 12, 1891 . .	17 48·9	17 46·2	−2·7	17 48·8	+0·1
,, 13, ,, . .	17 44·5	17 43·2	−1·3	17 45·8	−1·3
,, 14, ,, . .	17 44·5	17 40·6	−3·9	17 43·2	+1·3
,, 14, ,, . .	17 48·8	17 46·5	−2·3	17 49·1	−0·3
			β=−2·6	Mean .	=±0·75
April 21, 1892 . .	17 41·8	17 39·6	−2·2	17 41·8	0·0
,, 21, ,, . .	17 41·8	17 39·8	−2·0	17 42·0	−0·2
,, 21, ,, . .	17 45·0	17 42·6	−2·4	17 44·8	+0·2
,, 21, ,, . .	17 44·8	17 42·6	−2·2	17 44·8	0·0
,, 21, ,, . .	17 42·8	17 40·2	−2·6	17 42·4	+0·4
,, 21, ,, . .	17 42·7	17 39·7	−3·0	17 41·9	+0·8
,, 22, ,, . .	17 39·8	17 38·1	−1·7	17 40·3	−0·5
,, 22, ,, . .	17 40·1	17 38·7	−1·4	17 40·9	−0·8
,, 22, ,, . .	17 44·9	17 42·5	−2·4	17 44·7	+0·2
,, 22, ,, . .	17 44·7	17 42·6	−2·1	17 44·8	−0·1
			β=−2·2	Mean .	=±0·32
Oct. 7, 1892 . .	17 40·0	17 35·4	−4·6	17 38·6	+1·4
,, 7, ,, . .	17 42·1	17 37·7	−4·4	17 40·9	+1·2
,, 7, ,, . .	17 40·1	17 37·8	−2·3	17 41·0	−0·9
,, 10, ,, . .	17 38·9	17 36·7	−2·2	17 39·9	−1·0
,, 10, ,, . .	17 43·8	17 40·8	−3·0	17 44·0	−0·2
,, 10, ,, . .	17 42·5	17 39·7	−2·8	17 42·9	−0·4
			β=−3·2	Mean .	=±0·85

Comparisons of Magnetometer 73 with the Kew Standard Instrument.

Date.	Observer.	S (Survey Instrument.)	K (Kew Instrument.)	K−S=β.	K−β=K′.	S−K′.
March 23, 1892 . .	G.	17° 43′·4	17° 42′·1	−1′·3	17° 43′·2	+0′·2
,, 23, ,, . .	G.	17 47·3	17 46·1	−1·2	17 47·2	+0·1
,, 23, ,, . .	G.	17 47·8	17 47·1	−0·7	17 48·2	−0·4
,, 23, ,, . .	G.	17 44·9	17 43·3	−1·6	17 44·4	+0·5
,, 24, ,, . .	G.	17 42·2	17 41·6	−0·6	17 42·7	−0·5
,, 24, ,, . .	G.	17 44·8	17 44·1	−0·7	17 45·2	−0·4
,, 24, ,, . .	G.	17 45·2	17 44·9	−0·3	17 46·0	−0·8
,, 25, ,, . .	G.	17 46·2	17 44·2	−2·0	17 45·3	+0·9
,, 25, ,, . .	G.	17 47·5	17 46·1	−1·4	17 47·2	+0·3
				β = −1·1	Mean . .	= ±0·46
Oct. 11, 1892 . . .	W.	17 40·5	17 37·9	−2·6	17 40·0	+0·5
,, 11, ,, . . .	W.	17 46·2	17 45·1	−1·1	17 47·2	−1·0
,, 11, ,, . . .	W.	17 42·1	17 40·4	−1·7	17 42·5	−0·4
,, 13, ,, . . .	W.	17 41·9	17 40·0	−1·9	17 42·1	−0·2
,, 13, ,, . . .	W.	17 43·8	17 41·8	−2·0	17 43·9	−0·1
,, 13, ,, . . .	W.	17 43·9	17 40·8	−3·1	17 42·9	+1·0
				β = −2·1	Mean . .	= ±0·53

Collecting the mean results into one table and subtracting from each 2′·5, so as to find the correction necessary to bring the readings of each instrument into accord with the survey standard above defined, we get the following results :—

Date.	Survey Instrument.				No. of Observations.	Observers.
	No. 60.	No. 61.	No. 70.	No. 73.		
July 17–18, 1884 . . .	– 0′·1	′ . .	′ . .	′ . .	2	R. and T.
April 2, 1886	. .	– 0·2	. .	. .	1	T.
Sept. and Oct., 1887 . .	– 0·3	. .	. .	. .	6	R.
,, ,, ,, . .	. .	0·0	. .	. .	6	T.
June 3–6, 1890 . . .	– 2·2	. .	. .	. .	7	G.
,, 13–18, ,, . . .	. .	– 2·9	. .	. .	6	B.
April 16–24, 1891 . .	. .	. .	– 6·1	. .	12	W.
Oct. 12–14, ,, . .	. .	. .	– 5·1	. .	4	W.
Nov. 12–18, ,, . .	– 1·9	. .	. .	. .	7	G.
,, 24, ,, . .	. .	– 1·8	. .	. .	6	G.
*Dec. 4, ,, . .	– 2·3	. .	. .	. .	6	G.
March 23–25, 1892 . .	. .	. .	. .	– 3·6	9	G.
April 21–22, ,, . .	. .	. .	– 4·7	. .	10	W.
Oct. 7–10, ,, . .	. .	. .	– 5·7	. .	6	W.
,, 11–13, ,, . .	. .	. .	. .	– 4·6	6	W.
,, 20–21, ,, . .	.	– 3·4	. .	. .	4	G.
,, 24–25, ,, . .	– 2·0	. .	. .	. .	4	G.

Upon this Table we base the following Table of Corrections, which were those actually used in the reductions.

Year.	Corrections applied to Magnetometers.			
	60	61	70	73
1884 to 88 . .	0′	0′	′	′
1889	–1·0	–1·0		
1890	–2·0	–2·0	–5·5	
1891	–2·0	–2·0	–5·5	
1892	–2·0	–4·6	–5·2	–4·1

The magnitude of the corrections which thus had to be applied to instruments all of which rank as "absolute" may cause surprise.

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* As there were only check observations on the more complete set taken in November, details are not given on p. 12.

Our results are, however, entirely confirmed by those of Dr. VAN RIJCKEVORSEL, who has proved that the differences between the standards of several of the principal European Magnetic Observatories, are of the same order of magnitude as those shown above.

Comparison at Kew of Horizontal Force Observations made with the Survey and Kew Instruments.

The calculations, by which the observations made with the Survey Instruments in 1887 were compared with the Kew Standards, were repeated with the modifications above described, with the result that the difference between the Kew and Survey Instruments was practically unaltered, being reduced only from 0·0029 to 0·0023 metric unit.

When a comparison was being made, the deflection experiment was performed on each day with the Survey Instrument. The moment of the magnet was determined from this and from a vibration experiment made immediately before or after it.

The vibration experiment was then repeated at intervals, the moment already determined being used in the calculations based on these additional observations.

Comparison of Magnetometer 60 with the Kew Standard.

Date.	Observer.	S (Survey Instrument).	K (Kew Instrument).	$K - S = \beta$.	$K - \beta = K'$.	$S - K' = 0·000$.
Sept. 30, 1887 . . .	R.	1·8117	1·8091	− 0·0026	1·8116	+ 1
Oct. 12 ,, . . .	R.	1·8096	1·8076	− 0·0020	1·8101	− 5
,, 19 ,, . . .	R.	1·8113	1·8083	− 0·0030	1·8108	+ 5
				$\beta = -$ 0·0025	Mean =	± 3·7
June 2, 1890	G.	1·8182	1·8160	− 0·0022	1·8168	+ 14
,, 3, ,, ...	G.	1·8164	1·8154	− 0·0010	1·8162	+ 2
,, 3, ,, ...	G.	1·8181	1·8170	− 0·0011	1·8178	+ 3
,, 4, ,, ...	G.	1·8164	1·8161	− 0·0003	1·8169	− 5
,, 4, ,, ...	G.	1·8195	1·8184	− 0·0011	1·8192	+ 3
,, 5, ,, ...	G.	1·8173	1·8169	− 0·0004	1·8177	− 4
,, 5, ,, ...	G.	1·8191	1·8188	− 0·0003	1·8196	− 5
,, 6, ,, ...	G.	1·8141	1·8140	− 0·0001	1·8148	− 7
,, 6, ,, ...	G.	1·8175	1·8169	− 0·0006	1·8177	− 2
				$\beta = -$ 0·0008	Mean =	± 5·0
Nov. 12, 1891	G.	1·8220	1·8198	$\beta = -$ 0·0022	1·8220	0
Feb. 1, 1892	G.	1·8194	1·8184	− 0·0010	1·8194	0
,, 1, ,, ...	G.	1·8195	1·8186	− 0·0009	1·8196	− 1
,, 1, ,, ...	G.	1·8200	1·8188	− 0·0012	1·8198	+ 2
,, 1, ,, ...	G.	1·8199	1·8189	− 0·0010	1·8199	0
,, 3, ,, ...	G.	1·8188	1·8166	− 0·0022	1·8176	+ 12
,, 3, ,, ...	G.	1·8193	1·8190	− 0·0003	1·8200	− 7
,, 3, ,, ...	G.	1·8195	1·8193	− 0·0002	1·8203	− 8
				$\beta = -$ 0·0010	Mean =	± 4·3
Oct. 24, 1892	G.	1·8185	1·8180	− 0·0005	1·8183	+ 2
,, 24, ,, ...	G.	1·8174	1·8179	+ 0·0005	1·8182	− 8
,, 25, ,, ...	G.	1·8183	1·8180	− 0·0003	1·8183	0
,, 25, ,, ...	G.	1·8189	1·8181	− 0·0008	1·8184	+ 5
				$\beta = -$ 0·0003	Mean =	± 3·7

Comparisons of Magnetometer 61 with the Kew Standard.

Date.	Observer.	S. (Survey Instrument).	K. (Kew Instrument).	K−S=β.	K−β=K′.	S−K′ =0·000.
Oct. 11, 1887	T.	1·8114	1·8092	−0·0022	1·8114	0
,, 13, ,, ...	T.	1·8092	1·8069	−0·0023	1·8091	+ 1
,, 18, ,, ...	T.	1·8117	1·8095	−0·0022	1·8117	0
,, 18, ,, ...	T.	1·8114	1·8094	−0·0020	1·8116	− 2
				β=−0·0022	Mean = ±	0·7
June 14, 1890	B.	1·8173	1·8166	−0·0007	1·8176	− 3
,, 14, ,, ...	B.	1·8185	1·8171	−0·0014	1·8181	+ 4
,, 14, ,, ...	B.	1·8188	1·8181	−0·0007	1·8191	− 3
,, 16, ,, ...	B.	1·8155	1·8154	−0·0001	1·8164	− 9
,, 16, ,, ...	B.	1·8155	1·8151	−0·0004	1·8161	− 6
,, 16, ,, ...	B.	1·8165	1·8160	−0·0005	1·8170	− 5
,, 17, ,, ...	B.	1·8192	1·8174	−0·0018	1·8184	+ 8
,, 17, ,, ...	B.	1·8185	1·8178	−0·0007	1·8188	− 3
,, 17, ,, ...	B.	1·8185	1·8185	0·0000	1·8195	−10
,, 18, ,, ...	B.	1·8190	1·8170	−0·0020	1·8180	+10
,, 18, ,, ...	B.	1·8192	1·8181	−0·0011	1·8191	+ 1
,, 19, ,, ...	B.	1·8159	1·8144	−0·0015	1·8154	+ 5
,, 19, ,, ...	B.	1·8158	1·8150	−0·0008	1·8160	− 2
,, 19, ,, ...	B.	1·8187	1·8189	+0·0002	1·8199	−12
July 28, ,, ...	B.	1·8195	1·8172	−0·0023	1·8182	+13
,, 28, ,, ...	B.	1·8208	1·8189	−0·0019	1·8199	+ 9
,, 28, ,, ...	B.	1·8208	1·8189	−0·0019	1·8199	+ 9
				β=−0·0010	Mean = ±	6·6
Feb. 2, 1892	G.	1·8187	1·8178	−0·0009	1·8182	+ 5
,, 2, ,, ...	G.	1·8186	1·8181	−0·0005	1·8185	+ 1
,, 2, ,, ...	G.	1·8194	1·8183	−0·0011	1·8187	+ 7
,, 2, ,, ...	G.	1·8197	1·8183	−0·0014	1·8187	+10
,, 3, ,, ...	G.	1·8180	1·8174	−0·0006	1·8178	+ 2
,, 3, ,, ...	G.	1·8172	1·8181	+0·0009	1·8185	−13
,, 3, ,, ...	G.	1·8178	1·8184	+0·0006	1·8188	−10
				β=−0·0004	Mean = ±	6·9
Oct. 20, 1892	G.	1·8161	1·8171	+0·0010	1·8165	− 4
,, 20, ,, ...	G.	1·8166	1·8183	+0·0017	1·8177	−11
,, 21, ,, ...	G.	1·8175	1·8174	−0·0001	1·8168	+ 7
,, 21, ,, ...	G.	1·8187	1·8184	−0·0003	1·8178	+ 9
				β= +0·0006	Mean = ±	7·7

Comparison of Magnetometer 70 with the Kew Standard. Observer: Mr. Watson.

Date.	S (Survey Instrument.)	K (Kew Instrument.)	K−S=β.	K−β=K′.	S−K′ =0·000.
April 16, 1891 .	1·8157	1·8185	+0·0028	1·8161	− 4
„ 20, „ .	1·8165	1·8194	+0·0029	1·8170	− 5
„ 20, „ .	1·8153	1·8181	+0·0028	1·8157	− 4
„ 21, „ .	1·8152	1·8174	+0·0022	1·8150	+ 2
„ 22, „ .	1·8125	1·8146	+0·0021	1·8122	+ 3
„ 22, „ .	1·8129	1·8156	+0·0027	1·8132	− 3
„ 22, „ .	1·8170	1·8197	+0·0027	1·8173	− 3
„ 23, „ .	1·8143	1·8167	+0·0024	1·8143	0
„ 23, „ .	1·8178	1·8200	+0·0022	1·8176	+ 2
„ 24, „ .	1·8156	1·8175	+0·0019	1·8151	+ 5
„ 24, „ .	1·8183	1·8208	+0·0025	1·8184	− 1
„ 24, „ .	1·8182	1·8201	+0·0019	1·8177	+ 5
			β= +0·0024	Mean=±	3·1
Oct. 12, 1891 .	1·8179	1·8201	+0·0022	1·8181	− 2
„ 12, „ .	1·8179	1·8201	+0·0022	1·8181	− 2
„ 13, „ .	1·8150	1·8167	+0·0017	1·8147	+ 3
„ 14, „ .	1·8175	1·8191	+0·0016	1·8171	+ 4
„ 14, „ .	1·8169	1·8191	+0·0022	1·8171	− 2
			β= +0·0020	Mean=±	2·6
April 21, 1892 .	1·8182	1·8198	+0·0016	1·8183	− 1
„ 21, „ .	1·8187	1·8201	+0·0014	1·8186	+ 1
„ 21, „ .	1·8197	1·8213	+0·0016	1·8198	− 1
„ 21, „ .	1·8197	1·8213	+0·0016	1·8198	− 1
„ 21, „ .	1·8197	1·8215	+0·0018	1·8200	− 3
„ 22, „ .	1·8177	1·8194	+0·0017	1·8179	− 2
„ 22, „ .	1·8185	1·8199	+0·0014	1·8184	+ 1
„ 22, „ .	1·8199	1·8212	+0·0013	1·8197	+ 2
„ 22, „ .	1·8202	1·8213	+0·0011	1·8198	+ 4
			β= +0·0015	Mean=±	1·8
Oct. 7, 1892 .	1·8164	1·8189	+0·0025	1·8174	−10
„ 7, „ .	1·8172	1·8200	+0·0028	1·8185	−13
„ 7, „ .	1·8194	1·8211	+0·0017	1·8196	− 2
„ 10, „ .	1·8177	1·8188	+0·0011	1·8173	+ 4
„ 10, „ .	1·8199	1·8199	0·0000	1·8184	+15
„ 10, „ .	1·8195	1·8207	+0·0012	1·8192	+ 3
			β= +0·0015	Mean=±	7·8

COMPARISON of Magnetometer 73 with the Kew Standard.

Date.	Observer.	S (Survey Instrument).	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′ =0·000.
March 23, 1892 . . .	G.	1·8160	1·8166	+0·0006	1·8160	0
,, 23, ,, . . .	G.	1·8150	1·8159	+0·0009	1·8153	− 3
,, 23, ,, . . .	G.	1·8152	1·8161	+0·0009	1·8155	− 3
,, 23, ,, . . .	G.	1·8163	1·8173	+0·0010	1·8167	− 4
,, 24, ,, . . .	G.	1·8163	1·8170	+0·0007	1·8164	− 1
,, 24, ,, . . .	G.	1·8172	1·8178	+0·0006	1·8172	0
,, 24, ,, . . .	G.	1·8180	1·8179	−0·0001	1·8173	+ 7
,, 25, ,, . . .	G.	1·8130	1·8129	−0·0001	1·8123	+ 7
,, 25, ,, . . .	G.	1·8137	1·8143	+0·0006	1·8137	0
				β= +0·0006	Mean = ± 2·8	
Oct. 11, 1892	W.	1·8137	1·8146	+0·0009	1·8139	− 2
,, 11, ,, ...	W.	1·8135	1·8143	+0·0008	1·8136	− 1
,, 11, ,, ...	W.	1·8162	1·8188	+0·0026	1·8181	−19
,, 13, ,, ...	W.	1·8167	1·8162	−0·0005	1·8155	+12
,, 13, ,, ...	W.	1·8163	1·8164	+0·0001	1·8157	+ 6
,, 13, ,, ...	W.	1·8167	1·8173	+0·0006	1·8166	+ 1
				β= +0·0007	Mean = ± 6·8	

Magnetometers 60 and 61 were in such close accord in 1887 that we may regard the mean value of β, viz., — 0·0023, as common to both of them at that date, *i.e.*, we assume that both instruments then gave results 0·0023 metric or 0·00023 C.G.S. unit above the Kew Standard. This is therefore the Survey Standard. To find the correction to be applied to any instrument to reduce it to the Survey Standard, we must add 0·0023 to the value of β. The numbers so obtained are shown in the following Table, in which the corrections are expressed in terms of 0·0001 metric unit :—

Date.	Survey instrument.				No. of observations.	Observers.
	No. 60.	No. 61.	No. 70.	No. 73.		
Sept.–Oct., 1887	− 2	..	..	..	3	R.
Oct., 1887	..	+ 1	..	..	3	T.
June 2–6, 1890	+ 15	..	..	..	9	G.
June–July, ,,	..	+ 13	..	..	17	B.
April 16–24, 1891	..	..	+ 47	..	12	W.
Nov. 12, ,,	+ 1	..	..	..	1	G.
Oct. 12–14, ,,	..	..	+ 43	..	5	W.
Feb. 1–3, 1892	+ 13	..	..	..	7	G.
,, 2–3, ,,	..	+ 19	..	..	7	G.
March 23–25 ,,	..	..	..	+ 29	9	G.
April 21–22 ,,	..	..	+ 38	..	9	W.
Oct. 7–10 ,,	..	..	+ 38	..	6	W.
,, 11–13 ,,	..	..	..	+ 30	6	W.
,, 20–21 ,,	..	+ 29	..	..	4	G.
,, 24–25 ,,	+ 20	..	..	..	4	G.

From this Table we draw the following conclusions with respect to the years 1889 to 1892.

Instruments 60 and 61 appear to have changed between 1887 and 1890. There does not appear to have been any further important change during 1890 and 1891, and we, therefore, take the means of the values obtained in those years as applicable to them.

The observations made at the end of the year 1892 give higher values than those made in February of that year, though the fact that the apparent change in the indications of the two instruments is the same in each case, again suggests that the main error in these comparisons is due to the uncertainty of the zero line of the self-registering instruments rather than to the absolute instruments themselves. This argument is in turn weakened by the fact that no such change was observed in the case of the comparisons of Instruments 70 and 73 undertaken during the same year, at intervals of 6 or 7 months, as against the 8 months which elapsed between the earlier and later comparisons of Nos. 60 and 61.

We have therefore taken the mean of the corrections determined at the beginning and end of 1892 as applicable to that year.

The following Table gives the corrections actually applied to the results of the different instruments for each year, expressed in terms of 0·0001 metric unit.

Year.	Corrections applied to Magnetometers.			
	60	61	70	73
1884-88	0	0		
1889	+ 7	+ 8		
1890	+13	+16	+46	
1891	+13	+16	+46	
1892	+15	+24	+38	+29

Comparison at Kew of Dip Observations made with the Survey and Kew Instruments.

In our earlier survey, we made at Kew a number of Dip Observations sufficient to prove that our two instruments were in accord, but we compared them only with the absolute measurements made with the Kew Dip Circle as they were at that time published, *i.e.*, uncorrected for diurnal variation or disturbance. As the corrections are small, this was sufficient for our purpose, and it is further justified by the fact that the measurements made at Kew with all the Dip Circles we have since employed have proved to be in such close agreement that no corrections have been considered necessary to reduce them to a common standard.

In our later work, however, we have adopted the plan of comparing our uncorrected Dip Observations with the angle whose tangent is the ratio of the Vertical and Horizontal Forces, as given by the magnetograph at the time of the Dip Observations. It is evident that this method introduces the errors of the base lines of the self-registering instruments, while it has the advantage of making the indications compared with those of the Dip Circle contemporaneous with the Dip Observations.

The result is to bring the Survey Dip Circles into close agreement with the Kew Instruments used in this way.

COMPARISONS at Kew of Dip Circle, No. 74, with the Kew Standard.

Date.	Observer.	S (Survey Instrument).	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′.
Sept. 30, 1887 . .	R.	67° 35′·1	67° 35′·4	+0′·3	67° 34′·8	+0′·3
Oct. 19, „ . .	R.	67 34·2	67 35·1	+0·9	67 34·5	−0·3
				β=+0·6	Mean =±0·3	
June 2, 1890 . . .	G.	67 31·1	67 32·0	+0·9	67 31·6	−0·5
„ 3, „ . . .	G.	67 32·3	67 32·6	+0·3	67 32·2	+0·1
„ 4, „ . . .	G.	67 31·6	67 31·2	−0·4	67 30·8	+0·8
„ 5, „ . . .	G.	67 29·9	67 31·0	+1·1	67 30·6	−0·7
„ 6, „ . . .	G.	67 32·2	67 32·4	+0·2	67 32·0	+0·2
				β=+0·4	Mean =±0·5	
March 25, 1892 . .	G.	67 30·9	67 31·1	+0·2	67 30·3	+0·6
„ 25, „ . .	G.	67 30·1	67 31·6	+1·5	67 30·8	−0·7
				β=+0·8	Mean =±0·6	
Oct. 24, 1892* . .	G.	67 32·1	67 31·2	−0·9	67 31·8	+0·3
„ 24, „ . .	G.	67 32·3	67 31·4	−0·9	67 32·0	+0·3
„ 24, „ . .	G.	67 32·3	67 31·3	−1·0	67 31·9	+0·4
„ 25, „ . .	G.	67 31·0	67 30·9	−0·1	67 31·5	−0·5
„ 25, „ . .	G.	67 30·5	67 30·5	0·0	67 31·1	−0·6
„ 25, „ . .	G.	67 31·1	67 30·2	−0·9	67 30·8	+0·3
				β=−0·6	Mean =±0·4	

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* The Observations in October were made with Needle No. 1, and with Needle No. 1 belonging Dip Circle 83, see p. 7.

Comparisons at Kew of Dip Circle, No. 83, with the Kew Standard.

Date.	Observer.	S (Survey Instrument).	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′.
		° ′	° ′	′	° ′	′
Oct. 11, 1887 . . .	T.	67 34·3	67 35·3	+1·0	67 34·5	−0·2
,, 13, ,, . . .	T.	67 36·0	67 36·4	+0·4	67 35·6	+0·4
,, 18, ,, . . .	T.	67 34·2	67 35·2	+1·0	67 34·4	−0·2
				β= +0·8	Mean = ± 0·3	
June 14, 1890 . . .	B.	67 30·1*	67 31·3	+1·2	67 29·7	+0·4
,, 16, ,, . . .	B.	67 29·9	67 31·8	+1·9	67 30·2	−0·3
,, 17, ,, . . .	B.	67 29·3	67 31·2	+1·9	67 29·6	−0·3
,, 18, ,, . . .	B.	67 30·5	67 31·9	+1·4	67 30·3	+0·2
,, 19, ,, . . .	B.	67 31·8†	67 33·2	+1·4	67 31·6	+0·2
				β= +1·6	Mean = ± 0·3	
April 20, 1891 . .	W.	67 29·3	67 30·5	+1·2	67 29·1	+0·2.
,, 21, ,, . .	W.	67 29·0	67 30·4	+1·4	67 29·0	0·0
,, 22, ,, . .	W.	67 29·6	67 31·3	+1·7	67 29·9	−0·3
				β= +1·4	Mean = ± 0·2	
Oct. 20, 1892 . . .	G.	67 30·5	67 30·5	0·0	67 29·8	+0·7
,, 20, ,, . . .	G.	67 30·0	67 30·3	+0·3	67 29·6	+0·4
,, 21, ,, . . .	G.	67 29·6	67 31·2	+1·6	67 30·5	−0·9
,, 21, ,, . . .	G.	67 31·0	67 30·8	−0·2	67 30·1	+0·9
,, 21, ,, . . .	G.	67 29·4	67 31·2	+1·8	67 30·5	−1·1
				β= +0·7	Mean = ± 0·8	

The observations in 1891–92 were made with needles 2 and 3, see p. 7.

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* Needle 2 only.

† Needle 1 only.

COMPARISONS at Kew of Dip Circle, No. 94, with the Kew Standard. Observer, Mr. WATSON.

Date.	S (Survey Instrument).	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′.
Oct. 13, 1891 . .	67° 30′·7	67° 31′·3	+0′·6	67° 31′·1	−0′·4
,, 14, ,, . .	67 31·2	67 31·7	+0·5	67 31·5	−0·3
,, 16, ,, . .	67 32·3	67 31·9	−0·4	67 31·7	+0·6
,, 16, ,, . .	67 31·2	67 31·2	0·0	67 31·0	+0·2
,, 16, ,, . .	67 30·4	67 30·5	+0·1	67 30·3	+0·1
			β=+0·2	Mean = ± 0·3	
Feb. 12, 1892 . .	67 31·4	67 30·4	−1·0	67 30·8	+0·6
,, 12, ,, . .	67 30·6	67 30·3	−0·3	67 30·7	−0·1
,, 12, ,, . .	67 30·1	67 30·3	+0·2	67 30·7	−0·6
			β=−0·4	Mean = ± 0·4	
Oct. 7, 1892 . .	67 29·7	67 29·0	−0·7	67 29·5	+0·2
,, 7, ,, . .	67 29·7	67 28·8	−0·9	67 29·3	+0·4
,, 10, ,, . .	67 30·5	67 29·5	−1·0	67 30·0	+0·5
,, 10, ,, . .	67 29·5	67 30·0	+0·5	67 30·5	−1·0
			β=−0·5	Mean = ± 0·5	

COMPARISONS at Kew of Dip Circle No. 99 with the Kew Standard.

Date.	Observer.	S (Survey Instrument).	K (Kew Instrument).	K−S=β.	K−β=K′.	S−K′.
Oct. 13, 1891 . . .	W.	67° 30′·6	67° 30′·9	+0′·3	67° 30′·5	+0′·1
,, 14, ,, . . .	W.	67 32·3	67 32·3	0·0	67 31·9	+0·4
,, 16, ,, . . .	G.	67 32·0	67 32·0	0·0	67 31·6	+0·4
,, 16, ,, . . .	G.	67 30·8	67 31·5	+0·7	67 31·1	−0·3
,, 16, ,, . . .	G.	67 30·5	67 30·8	+0·3	67 30·4	+0·1
,, 16, ,, . . .	G.	67 29·3	67 30·5	+1·2	67 30·1	−0·8
				β=+0·4	Mean = ± 0·3	
Oct. 11, 1892 . . .	W.	67 31·8	67 32·3	+0·5	67 31·8	0·0
,, 11, ,, . . .	W.	67 32·1	67 32·0	−0·1	67 31·5	+0·6
,, 13, ,, . . .	W.	67 31·2	67 31·7	+0·5	67 31·2	0·0
,, 13, ,, . . .	W.	67 30·7	67 31·7	+1·0	67 31·2	−0·5
				β=+0·5	Mean = ± 0·3	

All the values of β obtained from the above Tables are collected below.

Date.	Dip circle.			
	No. 74.	No. 83.	No. 94.	No. 99.
	′	′	′	′
Sept.-Oct., 1887 . .	+0·6			
Oct., 1887	..	+0·8		
June 2–6, 1890 . .	+0·4			
„ 14–19, 1890 . .	..	+1·6		
April 20–22, 1891 . .	..	+1·4		
Oct. 13–16, 1891 . .	..	..	+0·2	
„ „ . .	..	..	..	+0·4
Feb. 12, 1892 . . .	..	..	−0·4	
March 25, 1892 . .	0·8			
Oct. 7–10, 1892 . .	..	..	−0·5	
„ 11–13, „ . .	..	..	..	+0·5
„ 20–21, „ . .	..	+0·7		
„ 24–25, „ . .	−0·6			

None of these numbers, except perhaps those obtained from the observations made with No. 83 in 1890–91, are large enough to make it necessary to apply a correction to Dips measured with the Instruments. As regards No. 83, it was not used in 1891, and the correction which would be applied for 1890, though relatively large, is absolutely small. We therefore decided that the readings of the Dip Circles should be used without correction.

The mean of the β's is + 0′·4, so that on the average the Survey Instruments read 0′·4 below the Kew Standard.

Summary of Differences between Kew and Survey Standards.

The final conclusion therefore to which we come, as the result of our comparisons with the Kew Standards, is that to reduce either our observations at any particular place, or the calculated values, deduced from our iso-magnetics, to what they would have been if the Kew Instruments had been used—

(1) The Declinations must be increased by 2′·5, and

(2) The Horizontal Forces diminished by 0·0023 metric or 0·00023 C.G.S. unit.

(3) The Dips require no correction.

It will, of course, be understood that the results to which these corrections are applied, have been already reduced to the Survey Standard by means of the Tables given above.

Time Signals.

We have again to thank Admiral WHARTON, R.N., F.R.S., Chief Hydrographer to the Admiralty, for the loan of chronometers, and Mr. PREECE, F.R.S., Chief Engineer to the Post Office, and Mr. J. C. LAMB, the Head of the Telegraph Department, for the facilities afforded us for checking the chronometers by means of the telegraphic time signals which are daily sent to all post offices in the kingdom. In spite of the very large number of places at which it was desirable to receive the signal, the officials were warned when to expect the request for "time," as well as instructed to comply with it. As the rules ordinarily in force against the admission of unauthorised persons to the telegraph offices are, very properly, stringent, the hearty support we received from the Heads of the Department was essential and of great service.

Selection of Stations.

As we intended to increase the number of stations very largely, it was of course desirable that the new observations should be used in determining the terrestrial iso-magnetics.

We therefore decided that in 1890 and 1891 the country should be covered with a new network of stations fairly uniformly distributed over it, and that the results should all be reduced to January 1, 1891, so that the secular correction, being applied for a few months only, should be relatively unimportant.

From these observations, the terrestrial iso-magnetics for January 1, 1891, were determined, and the Disturbances and Disturbing Forces calculated and mapped. This work was completed by March, 1892, so that we were able to select the places at which observations were to be made in that year, with a full knowledge of the results which had already been obtained, and therefore in such positions as were likely to afford the most valuable information.

The work of observing was divided as follows :—

In 1890 Messrs. GRAY and BRISCOE observed in England and Wales ;
In 1891 Mr. GRAY travelled in Ireland and Mr. WATSON in Scotland ; and
In 1892 Mr. WATSON went to Ireland and Mr. GRAY to Scotland.

In both 1891 and 1892 a number of additional observations were made in England as the observers went to or returned from their more distant stations.

By interchanging observers and instruments we have aimed at preventing any systematic error, however small, affecting any part of the area of the survey.

In 1889 we ourselves made the two supplementary surveys in the West of Scotland and in Yorkshire and Lincolnshire, to which reference has already been made. Our thanks are due to Professor REINOLD, F.R.S., who accompanied Professor RÜCKER during part of this tour, and made a number of Dip observations.

In 1890 we worked together and ran a chain of stations across the country from London to Penrith.

In 1891 and 1892 Dr. THORPE observed in Scotland and the Western Isles, and in 1892 Professor RÜCKER added some stations in the Midlands.

In determining the total number of stations, it must be remembered that at many places, especially in disturbed districts, the instruments were moved from the position first chosen, and some or all of the elements were re-determined in a new place.

In all such cases we have only counted the second position as a separate station if all the elements were independently determined at it.

On the other hand, at a few places stress of weather or other circumstances prevented our measuring all the elements. Such places, when distant from other stations, are counted separately.

In 1892 it was found to be desirable, for reasons given below, to repeat at some stations the observations made in the earlier survey.

These are called "repeat stations," and are not numbered separately in the lists which follow.

The number of stations allotted to each observer was as follows :—

Year.	Observer.	No. of stations.	No. of repeat stations.
1889	Professor Rücker	35	
	Dr. Thorpe	15	
1890	Professor Rücker and Dr. Thorpe	30	
	Mr. Gray	78	
	Mr. Briscoe	56	
1891	Dr. Thorpe	34	
	Mr. Gray	115	
	Mr. Watson	90	
1892	Professor Rücker	9	3
	Dr. Thorpe	22	3
	Mr. Gray	91	8
	Mr. Watson	102	10
	Total	677	24

It will thus be seen that in the 1891 survey observations have been made at 701 places.

In the 1886 survey we observed at 205 places, and, adding these to the total of the first column in the above Table, we get a grand total of 882 places in the United Kingdom at which the magnetic elements have now been determined.

The following Tables show how the stations were distributed in the principal divisions of the kingdom, and also the number of determinations made of the various data required for the calculation of the magnetic elements.

Number of Stations.

Scotland	1886	54
	1891	190
England and Wales	1886	107*
	1891	345
Ireland	1886	44
	1891	142
Total		882

Number of Separate Observations.

Epoch of survey.	Dips.	Deflections.	Vibrations.	Geographical meridian.	Magnetic meridian.
1886	422	186	259	344	362
1891	1368	521	944	928	958
Total	1790	707	1203	1272	1320

Positions of Stations.

In our earlier survey we determined the positions of our stations by making notes while in the field and by marking them on such maps as we carried with us. The latitude and longitude were determined in the case of some of the Scotch stations from the Admiralty charts, but generally from the Ordnance maps, which were lent to us for the purpose when we returned to London. This was the best course then open to us, but it was probable that the latitudes and longitudes would be affected with greater inaccuracies than if the stations had been marked on the Ordnance maps when we were actually on the observing ground. In our later work we have been able to adopt the latter plan. The Board of Agriculture has been good enough to present to us an entire series of the Ordnance maps, on condition that on completion of the survey they shall become the property of the Royal Society. Our best thanks are due to the Board and to Colonel Sir CHARLES WILSON, K.C.B., F.R.S., the head of the Ordnance Survey, for this valuable and useful gift.

Messrs. GRAY and WATSON have observed at about 26 stations included in the

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[*] Inclusive of five supplementary stations along the Valley of the Wye, at which Dip Observations only were made in 1889.

1886 survey, and have, as was to be expected, found small inaccuracies in the latitudes and longitudes of several of them, as given in our earlier paper. The correct values are entered in the Table of Errata at the end of this Memoir. In no case have the errors been of any importance except in so far as they might make it more difficult to recognize the precise spots at which we observed.

It is, however, very probable that the latitudes and longitudes of others of the 1886 survey stations are affected with similar small errors, but, if these cause any doubt, the written descriptions and bearings of conspicuous objects which we recorded will in general be sufficient to resolve it.

Methods of Taking, Correcting, and Tabulating the Observations.

On all these points the methods adopted were, with one or two exceptions, practically identical with those used in our previous survey. The modifications of the telescope of the Kew Magnetometer introduced by us ('Phil. Mag.,' Aug. 1888, p. 122), were applied to all the instruments, and were found to facilitate the sun observations.

Some new forms have been used in the tabulation of the observations. In particular a convenient double page form has been used for the calculation of the sun's azimuth, in which a place is provided for every detail of the calculations.

In order to remind the observers of the various points to be attended to in the choice of a station and during the observations, a form was provided, in which questions were asked which they answered at the time of observation and while still at the station.

As the number of stations to be dealt with was so large, it was necessary to make the work of computing as light as possible. Except, therefore, in the case of the two supplementary surveys made by ourselves in 1889 before the large extension of the survey was determined on, we omitted the more rigorous method of making the two values of H and m (the moment of the magnet), given by each experiment, absolutely independent ("Mem.," 90, pp. 72–73). The values of the quantities v and Δ, defined in our last paper (pp. 70–76), were also used with the signs changed, as it was found that fewer errors were made in the computing if all such quantities were entered as *corrections* instead of as *errors*.

The following Table gives the mean values of P (in metric units) obtained for each year during the survey. For the purpose of comparison the part of the Table published in our former paper is added.

Year.	Magnetometer.			
	No. 60.	No. 61.	No. 70.	No. 73.
1884	0·000817			
1885	0·000866			
1886	0·000828	0·000753		
1887	0·000809	0·000693		
1888	0·000800	0·000706		
1889	0·000840	0·000800		
1890	0·000786	0·000707	0·000934	
1891	0·000799	0·000753	0·000925	
1891	0·000811			
1892	0·000814	0·000718	0·000907	0·000734

In 1891 the final reduction of the observations made with No. 60 was begun before the conclusion of the field work for the year. Hence the results were divided into two batches, corresponding to dates before and after July 31, and P was determined separately for each. The same course was adopted for No. 70, but the two values of P were, in this case, found to be identical.

It must be borne in mind that the number of observations on which the above results depend are very different in different years. Thus, in 1889, only 9 determinations of P were made with No. 61, and 21 with No. 60.

The values for No. 61, in 1891 and 1892, both depend on 15, and that of No. 73, in 1892, on 16 observations. On the other hand, the results obtained with the instruments which were more frequently used, depend on between 50 and 90 independent determinations.

The coloured glasses used to shield the eye in the sun observations are generally placed in the eye-piece of the telescope. When the brightness of the sun is variable, owing to the rapid alternation of cloud and clear sky, it is necessary to change the glasses frequently and quickly. This can hardly be done without turning the telescope about its axis, which is inconvenient and involves error if all the readings are not made exactly at the intersection of the cross-wires. We have, therefore, had the glass screens placed in front of the object-glass, so that they can be used without touching the telescope. If they are wedge-shaped, this causes a slight displacement of the image, which can, however, be determined once for all, and allowed for. All the glasses used were very nearly plane. The corrections rarely exceed 20″, but they were applied in all cases.

Errors of Experiments.

The probable errors of the observations of the Assistant Observers were worked out for the first year in which each of them was employed. The results were as follows :—

Observer.	Year.	Declination.		H (metric).		Dip.	
		No. of observations.	Probable error.	No. of observations.	Probable error.	No. of observations.	Probable error.
GRAY	1890	55	±0′·6	53	±0·0007	77	±0′·5
BRISCOE . . .	1890	47	±0·6	44	±0.0007	56	±0·4
WATSON . . .	1891	67	±0·5	72	±0·0006	95	±0·3

These figures are very satisfactory, and are a sufficient proof of the high standard of the work of these gentlemen.

Secular Corrections for the Reduction of the 1891 *Survey to Epoch.*

It has been already explained that in the year 1890–91 we covered the country with a new network of stations which were to serve as a means of calculating the position of the terrestrial iso-magnetics on January 1, 1891. The corrections for secular change had, therefore, only to be determined for the short periods from April, 1890, and from October, 1891 to the epoch.

For this purpose we used the table given at the end of our last Memoir ("Mem.," 90, p. 325). As the corrections had to be applied to the observations made in 1892 for a longer interval of time—about 18 months—and as the period of maximum sunspots was approaching, it was necessary to inquire whether the same method of calculating the secular change could be applied to the work of that year without appreciable error.

This could be tested for the south of England by comparing the actual change in the Declination at Kew between January 1, 1891, and July 1, 1892, with the tabular values of the secular variations for the same period.

To assure ourselves that the observed results were free from any temporary disturbances, we calculated them in several different ways as follows :—

Mean Declination at Kew for the whole of 1890 and 1891 = 17° 46′·2

,, for December, 1890 . . . . = 17° 46′·8
,, ,, January, 1891 . . . . = 17° 45′·7

Mean of the two months . . 17° 46′·2

Hence we get the same result for January 1, 1891, whether we take the mean of the two months or of the two years of which that day is the central date.

We could not apply the same test to July 1, 1892, as the reductions were made at the end of that year before the Declinations in the later months were known. We therefore took the four months from May to August, 1892, and compared the mean with that of the two months, June and July.

The results were :—

Mean of the four months, May to August	17° 36′·8
,, ,, two ,, June and July	17° 36′·5

The secular change at Kew, according to our 1890 Memoir is — 6′·35 per annum. Hence the calculated Declination on July 1, 1892, deduced from this figure and the value for January 1, 1891, is

$$17° \ 46'\cdot 2 - 6'\cdot 35 \times 1\cdot 5 = 17° \ 36'\cdot 7$$

which falls between the results calculated from the means of two and four months respectively.

It is evident, therefore, that our published Table of secular change is in very close accord with fact, and as the differences between it and the new Table obtained in this paper from a comparison of the two surveys are insignificant when the period considered is only 18 months, we thought it best, as a general rule, to reduce the 1892 observations to epoch by the same Table as that employed for 1890 and 1891.

Results of the Observations.

Although in tabulating the results of the observations we follow the same plan as that adopted in our previous paper, it is desirable to repeat in this place the facts which are necessary to explain it.

The stations are arranged in the following order :—

Three groups are formed as before, comprising Scotland, England and Wales, and Ireland, respectively.

In each group the whole number of stations at which observations were made in the two surveys, are arranged in alphabetical order, and are numbered continuously throughout.

As the names are now printed on the maps, it is unnecessary to enter these numbers on an index map as was previously done.

In the subjoined abstracts of the results, those obtained in the previous survey are not repeated, but the names of the stations appear in their proper places, together with a reference to their positions, in our former memoir. Of course, in the case of the "repeat" stations, the new data are fully given.

The Scotch stations, from Aberdeen to Wigtown, are numbered from 1 to 244, and it should be mentioned that the name of a Loch is regarded as determining the initial letter. Thus East Loch Tarbert is found under T.

The English and Welsh stations, including the Isle of Man and the Channel Isles from Abergavenny to Yarmouth, are numbered from 245 to 696.

The Irish stations from Annalong to Youghal, are numbered from 697 to 882.

The data given in each case are as follows :—

(1.) The number and name of the station.
(2.) Date of the observations.
(3.) Initials of the observer and numbers of the instruments.
(4.) Latitude and longitude of the station.

For the Declination we give :—

(1.) The time from the southing of the sun (Σ) at which the geographical meridian was determined by sun observations, a positive sign indicating the afternoon.
(2.) The Greenwich Mean Time (G.M.T.) of the determinations of the magnetic meridian. The time is reckoned from the preceding midnight.
(3.) The observed Declinations with all corrections applied (δ).
(4.) The mean observed Declination reduced to the epoch January 1, 1891 (δ_0).

For the Inclination we give :—

(1.) The number of the needle.
(2.) The G.M.T. at which the observation was made.
(3.) The observed Dip, with all corrections applied (θ).
(4.) The mean observed Dip reduced to epoch (θ_0).

For the Horizontal Force we give :—

(1.) The G.M.T. at which the deflection (D) and vibration (V) were observed.
(2.) The corrected independent forces found as described in "Mem.," 90, p. 73, but corrected for diurnal variation and disturbance (H), are given for stations at which observations were made in 1889. For subsequent dates only one value of the Force is deduced from the observations the value of which is equal to the mean of those obtained by the other method (see p. 31 above).
(3.) The mean observed Horizontal Force reduced to epoch (H_0).

Longitudes are to be taken as West of Greenwich unless the contrary is expressly stated.

In cases where two stations were very near together the same latitude and longitude were used in the reduction of the observations made at both, and this value is given for both in the following Tables.

The bearings are all from the geographical points of the compass, unless it is stated that they are magnetic.

We think that the data thus given are sufficient for ordinary purposes, but, as stated in our previous paper, we intend to place full details of the observations and calculations in the hands of the Royal Society, so that, if necessary, they can be referred to.

DESCRIPTIONS OF SCOTCH STATIONS.

1. ABERDEEN (1). See "1890 Memoir," p. 95.

2. Between ABERDEEN and ELLON (2). Declination, July 14, 1892; Force and Dip, July 12; G. (60, 74). Lat. 57° 19′ 16″; Long. 2° 2′ 22.″ About 4 miles from Ellon, in a field E. of the road, and 300 yards S. of "Fontainebleau" Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 55	14 15	19 14·8	19 25·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 1	71 14·6	71 16·2
83 1	13 14	71 14·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 37	1·5735	1·5706
V	12 15		

3. Between ABERDEEN and ELLON (3). (BALMEDIE). July 14, 1892; G. (60, 74). Lat. 57° 15′ 10″; Long. 2° 3′ 22″. In a field S. of a lane running E. out of the main road, a little to the N. of the village of Balmedie; 300 yards from the road, and about 250 yards from Balmedie House, which bore 30° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
− 1 18	11 8	19 1·5	19 12·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 1	71 25·9	71 27·8
83 1	12 14	71 26·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 39	1·5614	1·5585
V	11 20		

4. Between ABERDEEN and ELLON (4). (TARBOTHILL). July 14, 1892; G. (60, 74). Lat. 57° 12′ 26″; Long. 2° 4′ 50″. About 4 miles N. of Aberdeen, 150 yards E. of the high-road, and 10 yards S. of a lane leading to Tarbothill Farm. An old watch-house on a hill bore 50° E. of N., about $\frac{1}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 19	15 40	19 10·9	19 21·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 7	70 49·7	70 51·2

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 50	1·6083	1·6054

5. Between Aberdeen and Stonehaven (5). July 15, 1892; G. (60, 74). Lat. 57° 5′ 14″; Long. 2° 7′ 10″. About 4 miles S. of Aberdeen and about $\frac{1}{4}$ mile from the point where the road from Stonehaven divides into two branches. On a piece of open land N. of a bye-road (leading to Bankhead) which turns out of the westerly branch about $\frac{1}{4}$ mile N. of the fork.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 39	12 17	19 25·6	19 36·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 13	71 7·1	71 8·5
83 1	13 23	71 7·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 46	1·5861	1·5832
V	12 27		

6. Between Aberdeen and Stonehaven (6). July 15 and 16, 1892; G. (60, 74). Lat. 57° 3′ 30″; Long. 2° 9′ 0″. In a field on the W. side of the road, opposite Portlethen Moss. Cottage in the N.W. corner of the field bore 20° W. of N., about 300 yards distant.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 16 . . .	+2 6	14 28	19 48·8	19 59·8

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 15	1 83 1	15 3 15 14	71 0·0 70 59·1	71 1·0

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 15 . . .	V	14 37	1·6063	1·6034

7. Between ABERDEEN and STONEHAVEN (7). July 16, 1892; G. (60, 74). Lat 57° 0′ 48″; Long. 2° 10′ 16″. In the N.W. corner of a field about 4 miles N. of Stonehaven. The railway bridge over Muchalls Burn bore S.E. about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 47	11 43	19 33·0	19 44·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 83 1	12 38 12 50	70 58·1 71 0·6	71 0·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	12 15 11 54	1·5927	1·5898

8. Abington. August 13, 1891; W. (70, 94). Lat. 55° 29′ 44″; Long. 3° 41′ 33″. Near the W. wall of the field to the W. of the school.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 3	12 5	20 10·4	20 15·1
−1 1	15 10	20 10·4	
−0 49			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 46	70 9·8	70 10·9
2	14 9	70 10·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 53		1·6505
V	12 23	1·6525	
V	15 21	1·6509	

9. Aboyne. August 1, 1891; W. (70, 94). Lat. 57° 4′ 23″; Long. 2° 45′ 51″. In a field N. of the Dee; railway station bearing W. by N. and Waterside Farm S.W. by S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 10	11 40	20 54·2	20 57·7
+1 59	2 53	20 52·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 27	71 21·8	71 22·7
2	14 7	71 22·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 54		
V	11 54	1·5626	1·5625
V	15 23	1·5640	
V	16 43	1·5642	

10. ACHANALT. July 19, 1892; T. (61, 83). Lat. 57° 36′ 31″; Long. 4° 54′ 40″. In a field 150 yards due S. of the Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 5	11 44	21 12·2	21 24·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	11 15	71 31·6	71 32·6
3	11 27	71 30·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 58	1·5614	1·5582

11. ACHNASHELLACH. July 18, 1892; T. (61, 83). Lat. 57° 28′ 55″; Long. 5° 19′ 18″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 21	12 21	21 37·2	21 49·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 6	71 31·2	71 32·3
3	13 20	71 30·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 35	1·5593	1·5561

12. ALFORD. Aug. 6, 1891; W. (70, 94). Lat. 57° 14′ 22″; Long. 2° 41′ 15″. About 150 yards due S. of Haughton House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 24	11 29	20 6·6	20 11·2
−1 11	14 54	20 6·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 12	71 8·5	71 9·3
2	13 36	71 8·8	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	12 22		
V	11 45	1·5888	
V	15 8	1·5883	1·5875
V	15 26	1·5886	

13. **Altnabreac.** June 22, 1892; G. (60, 74). Lat. 58° 23′ 20″; Long. 3° 42′ 24″. On the open moorland, N. of the railway; water tank at the station bore S.E., about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ$_0$.
h. m.	h. m.	° ′	° ′
+1 4	13 2	21 2·5	21 14·0

Inclination.

Needle.	G.M.T.	θ.	θ$_0$.
	h. m.	° ′	° ′
1	13 43	71 51·7	71 53·0
83 1	13 55	71 51·6	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
V	13 12	1·5358	1·5328

14. Altnaharra. July 4, 1891; W. (70, 94). Lat. 58° 16′ 48″; Long. 4° 26′ 38″. Near the edge of the burn, to the S.W. of the Hotel, and about 150 yards W. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 31	12 0	21 14·9	21 18·1
+6 59	15 19	21 12·8	
+7 9			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 21	71 40·7	71 41·4
2	11 20	71 40·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m		
D	13 26		
V	12 32	1·5478	1·5471
V	14 6	1·5481	

15. Alyth. June 6, 1892; G. (60, 74). Lat. 56° 37′ 8″; Long. 3° 14′ 4″. In a field on the N.W. side of the bye-road, which turns out of Airlie Street by the Episcopal (St. Ninian's) Church. 100 yards from the road, and about 500 from the Church, which bore 30° N. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 38	10 55	20 15·9	20 26·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 1	70 40·2	70 40·9
83 1	12 15	70 38·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 32	1·6249	1·6220
V	11 8		

16. **Arbroath.** July 20, 1892; G. (60, 74). Lat. 56° 33′ 28″; Long. 2° 36′ 40″. In a field about 1 mile W. of the town, by the side of the road to Arbirlot. "Hospital Fields" House bore due S., about 300 yards distant; farm 30° N. of E., 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 20	15 44	19 15·9	19 27·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 8	70 40·9	70 42·5

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V.	15 53	1·6253	1·6224

17. **Ardgay**; June 29, 1891; W. (70, 94). Lat. 57° 52′ 44″; Long. 4° 22′ 0″. In a field to the S. of the road leading from Bonar Bridge Station to Ardgay Hill. S.W. of Bonar Bridge, and S.E. of the first cottage to the N. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 48	11 14	20 41·6	20 45·8
−1 30	15 27	20 42·0	

Inclination.

Needle.	G.M.T.	θ	θ_0.
	h. m.	° ′	° ′
1	13 2	71 31·6	71 32·1
2	13 26	71 31·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 6		1·5556
V	11 33	1·5566	
V	15 43	1·5561	

18. **Ardrossan.** August 20, 1891; W. (70, 94). Lat. 55° 39′ 16″; Long. 4° 48′ 6″. In a field about 250 yards S.S.E. of "Kirkhall," Stanley Farm, bearing S. by W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 46	12 0	20 48·6	20 53·4
+1 52	14 42	20 48·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 27	70 28·5	70 29·6
2	13 48	70 29·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 42		
V	12 14	1·6375	1·6367
V	15 16	1·6383	

19. **Arinagower.** See "1890 Memoir," p. 96.

20*a*. **Auchnasheen.** August 21, 1891; T. (61, 99). Lat. 57° 34′ 40″; Long. 5° 3′ 50″. The same station as 20b.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 7	13 51	21 23·0	21 26·6
	16 20	21 19·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 36	71 30·8	71 31·9
2	14 47	71 31·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 14		
V	14 3	1·5613	1·5626
V	16 31	1·5663	

20*b*. AUCHNASHEEN. July 13, 1891; W. (70, 94). Lat. 57° 34′ 40″; Long. 5° 3′ 50″. To the S.E. of the railway station, near the point at which the river changes its course from S. to E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 55	13 52	21 23·1	21 26·9
+3 55	17 10	21 21·8	
+5 56			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 51	71 28·4	71 29·0
2	16 23	71 28·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 8		
V	14 10	1·5655	1·5638
V	17 23	1·5640	
V	17 39	1·5651	
V	18 11	1·5646	

21. AULDGIRTH. July 28, 1892; W. (70, 94). Lat. 55° 9′ 35″; Long. 3° 42′ 35″. 150 yards W.N.W. of the bridge over the Nith.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 13	11 30	20 2·0	20 13·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 16	70 2·5	70 4·0
2	13 33	70 1·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	12 34 13 0	1·6616	1·6583

22. Loch Aylort. See "1890 Memoir," p. 96.

23. Ayr. See "1890 Memoir," p. 97.

24. Ballater. See "1890 Memoir," p. 97.

25. Ballindalloch. June 23, 1891; W. (70, 94). Lat. 57° 24′ 36″; Long. 3° 23′ 5″. On the top of the hill to the S. of the railway station, near the brow of the middle spur.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 2 +3 1	13 47 15 44	20 9·4 20 11·4	20 14·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 2	12 22 12 48	71 15·3 71 15·2	71 15·8

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V V	14 52 14 13 15 55	1·5835 1·5820	1·5819

26. Balmeanach Bay, Skye. July 13, 1892; T. (61, 83). Lat. 57° 20′ 12″; Long. 6° 6′ 20″. On the rising ground near the Cottage to the S. of the Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 39	14 35	20 41·0	20 53·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	15 41	72 25·6	72 25·7
3	15 27	72 22·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 50	1·5198	1·5166

27. Banavie. See "1890 Memoir," p. 98.

28. Banff. See "1890 Memoir," p. 99.

29. Loch Bay. September 8, 1892; T. (61, 83). Lat. 57° 29′ 42″; Long. 6° 33′ 51″. On some grassy ground at the head of the Loch, about 50 yards above high-water mark, and to the N. of the river Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 36	15 12	23 35·3	23 49·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 2	71 53·1	71 54·6
3	15 40	71 52·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 21	1·5691	1·5655

30. **Bearraraig.** August 29, 1892; T. (61, 83). Lat. 57° 29′ 53″; Long. 6° 8′ 55.′ About 100 yards from the shore, and between the Salmon Fisher's hut and the Waterfall. The hut bore 22° E. of N., and was about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 36	11 8	22 17·3	22 30·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	11 59	71 41·5	71 43·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 23	1·5512	1·5477

31. **Bernera.** August 10, 1889; T. (61, 83); Lat. 56° 47′ 12″; Long. 7° 37′ 30″. On the path up to the Lighthouse, and about 50 yards to the West of the Store above the landing-slip.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 0	12 6	23 54·8	23 43·1
	13 35	23 54·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 3	72 1·3	71 59·4
2	13 20	72 0·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 47	1·5319	1·5350

32. **Bervie.** July 20, 1892; G. (60, 74); Lat. 56° 50′ 35″; Long. 2° 16′ 38″. In the Park adjoining the Castle, which bore S.S.E., about 250 yards distant. Gable of the Castle Hotel 30° N. of E., 120 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 18	10 7	19 33·9	19 45·0

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	9 37	70 54·7	70 56·2
83 1	9 46	70 54·4	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
D	10 35	1·6002	1·5972
V	10 17		

33. **Berwick.** See "1890 Memoir," p. 99.

34. **Bettyhill.** July 2 and 3, 1891; W. (70, 94). Lat. 58° 31′ 35″; Long. 4° 13′ 20″. Near the centre of the field N. of the Hotel.

Declination.

Date.	Σ.	G.M.T.	δ.	δ₀.
	h. m.	h. m.	° ′	° ′
July 2 . . .	+1 57	14 52	21 13·0	21 17·2

Inclination.

Date.	Needle.	G.M.T.	θ.	θ₀.
		h. m.	° ′	° ′
July 2 . . .	2	17 21	71 56·7	71 57·1
	1	16 44	71 56·6	

Horizontal Force.

Date.	G.M.T.		H.	H₀.
		h. m.		
July 3 . . .	D	12 19	1·5345	1·5328
" 2 . . .	V	15 20	1·5329	
" 3 . . .	V	12 47		

35. **Blair Athol.** June 15 and 16, 1891. W. (70, 94). Lat. 56° 46′ 4″; Long. 3° 50′ 40″. Near the centre of the field to the N. of the lodge at the main entrance to the grounds of Blair Castle.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
June 16 . . .	−2 1	11 54	20 36·5	20 39·0
	+1 48	14 56	20 34·2	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
June 15 . . .	1	12 50	70 53·5	70 53·5
	2	13 24	70 52·5	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
June 15 . . .	D	14 38		1·6007
„ 15 . . .	V	15 18	1·6015	
„ 16 . . .	V	12 15	1·6014	

36. **Boat of Garten.** See "1890 Memoir," p. 100.

37. **L. Boisdale.** See "1890 Memoir," p. 101.

38. **Braemar.** July 30 and 31, 1891. W. (70, 94). Lat. 57° 0′ 42″; Long. 3° 23′ 34″. About 300 yards S.S.W. of Old Mar Castle. The first set of Horizontal Force observations were alone used in deducing the Disturbing Forces.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 30 . . .	+0 54	13 49	20 20·2	20 25·1
	+3 39	16 24	20 20·7	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 30 . . .	1	14 57	70 48·6	70 50·1
	2	15 22	70 50·2	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 31 . . .	D	10 57		
,, 30 . . .	V	14 4	1·6042	
		16 38	1·6056	1·6038
,, 31 . . .	V	11 38	1·6092	
		11 58	1·6099	1·6085

39. BRAEMORE, L. BROOM. August 8, 1892. T. (61, 83). Lat. 57° 46′ 7″; Long. 5°2′11″. In a field 50 yards to the W. of the road, and 40 yards N.W. of the Keeper's Lodge, at Braemore.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 4	13 56	21 22·8	21 35·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 30	71 36·2	71 37·2
3	14 51	71 35·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 16		
V	14 8	1·5640	1·5606

40. **Bridgend, Islay.** September 12, 1891; T. (61, 99). Lat. 55° 46′ 45″; Long. 6° 15′ 13″. On the N. bank of the River Sorn, at the head of L. Indaal, and about ¼ mile S.W. of the Inn at Bridgend.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 34	16 17	23 3·6	23 9·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 0	70 37·4	70 38·6
2	17 15	70 37·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 50	1·6414	1·6401
V	16 32		

41. **Broadford.** August 27, 1892; T. (61, 83). Lat. 57° 14′ 33″; Long. 5° 54′ 34″. On the W. side of the Bay, and 200 yards N. of the Post Office.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 14	11 31	23 32·0	23 45·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m	° ′	° ′
2	13 5	71 47·0	71 46·9
3	12 39	71 43·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 52	1·5584	1·5549

42. Brodick, Arran. September 15, 1891; T. (61, 99). Lat. 55° 35′ 4″; Long. 5° 9′ 27″. In a field at the head of the Bay, and on the N. side of the stream, about 70 yards from the shore.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 46	10 44	21 43·4	21 48·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 11	70 24·8	70 26·0
1	13 23	70 25·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 28		
V	10 55	1·6478	1·6465

43. **Broughton.** July 26, 1892; G. (60, 74). Lat. 55° 36′ 40″; Long. 3° 24′ 30″. In a field on the E. of the road running S. from the village, about 200 yards N. of the turning to the railway station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 11	11 18	19 59·8	20 11·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 48	70 15·2	70 16·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 28	1·6485	1·6453

44. **Buckie.** August 10, 1891; W. (70, 94). Lat. 57° 39′ 47″; Long. 2° 56′ 40″. About 150 yards due S. of Clean Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 30	11 41	21 4·1	21 9·2
+3 48	15 17	21 5·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 40	71 17·9	71 18·7
2	14 4	71 18·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 32		
V	11 56	1·5808	1·5802
V	15 47	1·5817	

45. **Bunnahabhain** (Islay). See "1890 Memoir," p. 101.

46. **Cabrach.** July 4, 1892; G. (60, 74). Lat. 57° 20′ 46″; Long. 3° 1′ 52″. On the level green by the right bank of Rouster Water, 40 yards above Rouster Bridge, about 1½ miles N. of Cabrach Kirk.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 54	12 0	20 20·0	20 31·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 51	71 21·7	71 22·8
83 1	13 1	71 20·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27		
V	12 9	1·5712	1·5682

47. Cairn-o'-Mount (Spitalburn). July 11, 1892; G. (60, 74). Lat. 56° 55′ 50″; Long. 2° 34′ 12″. On the E. side of the road between Spitalburn and Cairn-o'-Mount; about 1½ miles S. of the Shepherd's Cottage.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 19	h. m. 12 21	° ′ 19 59·2	° ′ 20 10·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 18	70 55·3	70 55·7
83 1	13 28	70 53·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 54		
V	12 33	1·6052	1·6022

48. Callander. July 24, 1891; W. (70, 94). Lat. 56° 14′ 23″; Long. 4° 13′ 3″. To the S. of the bridge, near the N. wall of the field in the angle between the Aberfoil and Invertrossachs roads.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 47	11 7	20 40·9	20 45·9
	11 19	20 41·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 31	70 31·6	70 32·3
2	13 53	70 31·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 34		1·6397
V	11 51	1·6407	
V	14 56	1·6407	

49. Callernish (Lewis), see "1890 Memoir," p. 102.

50. Camas-nan-Gall (Lochaber). September 9, 1889; T. (61, 83). Lat. 56° 49′ 42″. Long. 5° 7′ 25″. 100 yards to the N. of the Ferry House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 21	13 59	21 44·1	21 34·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 39	71 13·3	71 11·7
2	14 51	71 12·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 11	1·5892	1·5919

51. Campbelton, see "1890 Memoir," p. 103.

52. Canna, see "1890 Memoir," p. 103.

53. Carskey. September 23, 1891; T. (61, 99). Lat. 55° 18′ 40″; Long. 5° 41′ 50″. In a field, 400 yards N. of Carskey House.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 52	70 23·4	70 24·8
2	12 38	70 24·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 3		
V	12 10	1·6399	
V	13 36	1·6400	1·6386

54. Carsphairn. July 26, 1892; W. (70, 94). Lat. 55° 13′ 5″; Long. 4° 16′ 1″ About three quarters of a mile N.W. of the village. In a field between a cottage, marked Lagwine on the Ordnance Map, and the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 42	13 18	20 21·3	20 33·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 44	70 7·1	70 9·1
2	14 0	70 7·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 38		
V	12 11	1·6543	1·6510

55. CARSTAIRS. See "1890 Memoir," p. 104.

56. CASTLE BAY (BARRA). August 12, 1889; T. (61, 83). Lat. 56° 57′ 12″; Long. 7° 29′ 36″. Near the shore on the W. side of the Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 7	10 55	22 7·0	21 55·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 34	71 53·1	71 51·0
2	12 49	71 51·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 15	1·5275	1·5302
V	11 9	1·5268	

57. CASTLE DOUGLAS. September 3, 1891; W. (70, 94). Lat. 54° 56′ 37″; Long. 3° 56′ 53″. About 300 yards due S. of Blackpark Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 43	20 13·6	
+1 9	11 52	20 13·5	20 18·9
	13 46	20 14·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 34	69 55·5	69 57·0
2	14 10	69 56·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 9	1·6673	1·6660

58. L. CHEANN CHUISIL. August 25, 1889; T. (61, 83). Lat. 58° 5′ 6″; Long. 7° 1′ 42″. Near the shore at the Head of the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 28	11 50	22 56·2	22 44·2
+1 6	15 3	22 54·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 20	71 58·1	71 57·4
2	16 35	71 59·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 41	1·5357	1·5385
V	12 12	1·5353	

59. CLONAIG (CANTYRE). September 25, 1891 ; T. (61). Lat. 55° 45′ 8″; Long. 5° 23′ 39″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 39	10 53	21 38·9	21 44·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	11 30	70 32·0	70 33·0

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 4	1·6138	1·6120

60. COCK BRIDGE (near Corgarff Castle). July 7, 1892 ; G. (60, 74). Lat. 57° 10′ 10″; Long. 3° 13′ 42″. In a field 20 yards E. of the road to Toumintoul, and 300 yards N. of the Cock Bridge Inn. A cottage on the hill above the Inn bore due S., about 80 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 1 2	13 42	20 14·6	20 25·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 30	71 2·6	71 3·1
83 1	14 9	71 0·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 36		
V	13 52	1·5949	1·5919

61. L. Corrie. September 7, 1889; T. (61, 83). Lat. 56° 37′ 6″; Long. 5° 31′ 6″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 38	17 20	21 48·6	21 38·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 10	71 10·2	71 8·1
2	18 21	71 9·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	18 45	1·5906	
V	17 38	1·5917	1·5939

62. **Craigendowie.** July 18, 1892 ; G. (60, 74). Lat. 56° 48′ 38″ ; Long. 2° 46′ 50″. About a quarter of a mile S. of Craigendowie Lodge, 20 yards W. of the road, and 200 yards from a bridge over the Burn of Calletar.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 27	12 25	19 54·3	20 5·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 5	70 43·3	70 44·4
83 1	12 14	70 42·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 55		
V	12 35	1·6162	1·6131

63. **Crianlarich**, see "1890 Memoir," p. 105.

64. **Crieff**, see "1890 Memoir," p. 105.

65. **Crieff Junction.** May 31, 1892; G. (60, 74). Lat. 56° 16′ 22″; Long. 3° 43′ 58″. In a field W. of the Railway, and 200 yards from the Station, which bore 50° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 31	9 52	20 12·0	20 22·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 27	70 51·2	70 53·3
1	11 16	70 52·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 54		
V	10 2	1·6019	1·5991

66. Loch Crinan. July 30, 1891; T. (61, 99). Lat. 56° 5′ 25″; Long. 5° 33′ 28″. Behind the Hotel and above the Canal Basin. The latter about 400 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.		° ′
−2 28	10 19	21 46·0	21 50·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 54	70 41·4	70 42·3
2	11 11	70 41·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 32	1·6181	1·6170

67. **Cuil Bay.** August 15, 1891; T. (61, 99). Lat. 56° 38′ 37″; Long. 5° 17′ 42″. Near the shore at the head of the Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 53	h. m. 11 44 15 45	° ′ 21 19·4 21 18·5	° ′ 21 24·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
 1 2	h. m. 13 11 13 23	° ′ 71 0·1 71 0·2	° ′ 71 0·9

Horizontal Force.

G.M.T.		H.	H_0.
 D V	h. m. 12 34 11 58	1·6019	1·6007

68. **Cumbrae.** See "1890 Memoir," p. 106.

69. **Cupar.** July 21, 1892; G. (60, 74). Lat. 56° 19′ 12″; Long. 3° 1′ 30″. In the field on the E. side of the cricket-ground; the pavilion bore 55° W. of S., about 250 yards distant. Bondfield House bore due S., 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 42	h. m. 10 52	° ′ 20 4·8	° ′ 20 15·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 51	70 41·5	70 43·1
83 1	12 0	70 41·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 28	1·6225	1·6194

70. Dalmally. July 22, 1891; W. (70, 94). Lat. 56° 24′ 4″; Long. 4° 58′ 8″. Near the centre of the field to the S.E. of the Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 1 43	13 3	21 30·8	21 35·6
+ 2 34	14 49	21 31·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 30	70 37·4	70 38·3
2	13 45	70 37·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 14	1·6253	1·6246
V	15 26	1·6259	

71. **Dalwhinnie.** See "1890 Memoir," p. 107.

72. **Dingwall.** June 25, 1891; W. (70, 94). Lat. 57° 35′ 40″; Long. 4° 24′ 43″. In the field to the W. of the harbour; about 250 yards S. of the targets on the rifle range.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 36	20 46·3	20 51·0
+3 52	15 40	20 47·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 34	71 43·5	71 44·4
2	14 13	71 44·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 55	1·5464	1·5440
V	15 55	1·5441	

73. **Dinwoodie.** July 29, 1892; G. (60, 74). Lat. 55° 11′ 38″; Long. 3° 24′ 20″. In a field on the E. side of the road to Lockerbie, about 300 yards N. of the Hangingshaw Farm, and 200 yards W. of the Railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 1	11 31	20 0·1	20 11·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 17	69 55·6	69 58·5
83 1	10 27	69 56·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 1	1·6662	1·6630
V	11 41		

74. Dolphinton. July 25, 1892 ; G. (60, 74). Lat. 55° 42′ 57″ ; Long. 3° 24′ 30″. In the field on the S. side of the (North British) Railway Station ; the signal box bore due N., about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h m.	h. m.	° ′	° ′
+0 55	13 27	20 2·2	20 13·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 28	70 14·7	70 16·2
83 1	14 38	70 14·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 1	1·6513	1·6481
V	13 39		

75. ISLAND DONNAN (Loch Alsh). July 11, 1892; T. (61, 83). Lat. 57° 16′ 28″; Long. 5° 31′ 5″. In the grounds of Castle Donnan.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 34	14 38	22 7·6	22 19·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 20	71 33·2	71 34·5
3	16 6	71 32·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 31		
V	14 53	1·5617	1·5585

76. L. DOON (DALMELLINGTON). August 22, 1891; W. (70, 94). Lat. 55° 17′ 25″; Long. 4° 20′ 45″. About 40 yards S.W. of the bridge near Glenmuck.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 13	12 46	20 41·0	20 46·1
+4 55	16 55	20 41·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 2	70 5·7	70 7·0
2	14 32	70 6·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 2		
V	12 59	1·6557	1·6553
V	16 30	1·6571	

77. Dufftown. July 4, 1892; G. (60, 74). Lat. 57° 26′ 35″; Long. 3° 8′ 0″. In a field to the W. of the town, about 250 yards from the Episcopal Church, which bore 20° N. of E.; 100 yards S. of the road running W. from the Square, and 40 yards N. of a pine-wood.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 29	15 58	20 28·2	20 39·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 29	71 15·3	71 16·5
83 1	16 40	71 14·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 7	1·5937	1·5907

78. L. Duich. Aug. 2, 1889; T. (61, 83). Lat. 57° 13′ 24″; Long. 5° 25′ 6″. At the head of the Loch; within a sheep-fold close to the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 5 49	15 53	22 33·7	22 22·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 47	71 27·5	71 26·1
2	18 14	71 28·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 1	1·5730	1·5762
V	16 25	1·5733	

79. **Dumfries.** See "1890 Memoir," p. 107.

80. **Dunbar.** June 8, 1891; W. (70, 94). Lat. 55° 58′ 38″; Long. 2° 31′ 33″. In a field on Wester Broomhouse Farm, about 800 yards S.E. of the house; Spot Church bearing S.S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 29	16 26	19 44·6	19 48·2
+4 45	17 29	19 45·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 16	70 22·4	70 22·6
2	13 52	70 21·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 5		
V	11 27	1·6351	1·6356
V	17 16	1·6376	

81. **Dunblane.** May 30, 1892; G. (60, 74). Lat. 56° 11′ 6″; Long. 3° 57′ 40″. In Kippenross Park, the residence of Col. R. Stirling; lodge near the "Stirling Arms" Hotel, bore 18° W. of N., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 10	12 21	20 20·0	20 30·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 32	70 45·0	70 46·5

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 57	1·6089	1·6061
V	12 34		

82. **Dundee.** See "1890 Memoir," p. 108.

83. **Dunkeld.** June 9, 1892; G. (60, 74). Lat. 56° 33′ 43″; Long. 3° 34′ 55″. In a meadow on the S. side of the River, just below the Bridge. The South Door of the Cemetery Chapel bore 35° E. of N., about 80 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 26	11 2	19 34·3	19 44·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 58	71 0·9	71 2 0
83 1	12 9	70 59·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 36		
V	11 16	1·5972	1·5943

84. **Earlston.** May 25, 1892; G. (60, 74). Lat. 55° 38′ 24″; Long. 2° 40′ 32″. At the top of a field behind the Red Lion (Newton's) Hotel, the entrance to the stables of which bore 10° W. of S. about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
− 1 43	10 41	19 33·4	19 43·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 59	70 13·1	70 14·3
2	11 47	70 12·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 16		
V	10 52	1·6497	1·6469

85. **Edinburgh.** See "1890 Memoir," p. 109.

86. **Elgin.** See "1890 Memoir," p. 109.

87. **Ellon.** August 5, 1891; W. (70, 94), Lat. 57° 21′ 48″; Long. 2° 4′ 9″. In the field on the S. bank of the river, opposite the New Inn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 21	12 1	19 43·8	19 48·1
+2 15	14 6	19 43·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 56	71 9·9	71 10·7
2	13 25	71 10·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 3		
V	12 12	1·5843	
V	14 15	1·5839	1·5830

88. **Elvanfoot.** July 27, 1892; G. (60, 74). Lat. 55° 24′ 38″; Long. 3° 34′ 40″. On the W. side of the Carlisle and Glasgow Road, about 2 miles S. of Elvanfoot Railway Station. 250 yards S. of the turning leading to Upper Howeclench Farm, and about 300 yards S. of a Shepherd's house, known as "the Ring."

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 3	13 34	20 8·5	20 20·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 3	70 16·3	70 18·3
83 1	11 14	70 16·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 12		
V	11 49	1·6465	1·6433

89. **Loch Eriboll.** See "1890 Memoir," p. 110.

90. **Ewe Island.** August 25, 1891; T. (61, 99). Lat. 57° 50′ 32″; Long. 5° 38′ 1″. In a bight on the N.E. side of the island. The Manse at Aultbea bore E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 26	14 18	21 1·2	21 6·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 2	71 43·6	71 44·8
2	14 52	71 44·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 31	1·5415	1·5403

91. Fairlie. See "1890 Memoir," p. 111.

92. Falkirk. May 28, 1892; G. (60, 74). Lat. 55° 59′ 37″; Long. 3° 47′ 42″. In a field S. of the town, about 100 yards N. of the railway, 20 yards S.W. of four cross-roads, of which one runs S. to some saw-mills by the railway, and one N. into the town.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 22	11 2	20 34·3	20 44·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	11 26	71 0·0	71 2·6
1	11 38	72 2·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 0		
V	11 12	1·5889	1·5861

93. Forres. June 24, 1891; W. (70, 94). Lat. 57° 35′ 30″; Long. 3° 39′ 14″. On the cart-track through the field on the W. of Mundole Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 20	11 26	20 47·1	20 51·8
	14 49	20 48·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 27	71 23·1	71 23·7
2	13 52	71 23·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		1·5725
V	11 48	1·5735	
V	15 26	1·5733	

94. **Forsinard.** July 1, 1891; W. (70, 94). Lat. 58° 21′ 48″; Long. 3° 53′ 35″. On the E. side of the high road, about 150 yards S. of the Keeper's Cottage.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−3 13	9 51	21 30·5	21 34·5
−2 55			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 33	71 46·9	71 47·2
2	13 13	71 46·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 8		1·5486
V	10 35	1·5496	
V	14 7	1·5492	

95. FORT AUGUSTUS. See "1890 Memoir," p. 111.

96. FRASERBURGH. August 4, 1891 ; W. (70, 94). Lat. 57° 41′ 17″ ; Long. 2° 0′ 50″. In a field S.W. of the town, and about 300 yards due S.W. of the Church ; farmhouse bearing S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 32	11 13	19 54·2	20 0·4
+2 0	14 44	19 57·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 6	71 21·4	71 22·4
2	13 31	71 22·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. .m		
D	12 12		
V	11 30	1·5705	1·5687
V	14 58	1·5699	
V	15 16	1·5694	

97. LOCH GAIR (Argyllshire). September 20, 1891 ; T. (61, 99). Lat. 56° 3′ 32″ ; Long. 5° 19′ 46″. Close to the shore on the W. side of the Loch, and about 400 yards from the Tower at the entrance to the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 21	21 18·4	21 24·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	12 46	70 44·3	70 45·4
1	13 2	70 44·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8		
V	11 33	1·6052	1·6038

98*a*. **Gairloch.** See "1890 Memoir," p. 112.

98*b*. **Gairloch.** August 1, 1892; T. (61, 83). Lat. 57° 42′ 42″; Long. 5° 41′ 12″. About $\frac{1}{8}$ mile to the W. of the pier. This station was not far from that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 2 26	15 19	21 46·0	21 58·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	17 6	71 38·4	71 40·9
3	17 18	71 39·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 44	1·5419	1·5386

99. Girvan. August 24, 25, and 26, 1891; W. (70, 94). Lat. 55° 14′ 35″; Long. 4° 50′ 7″. In a field to the W. of Houdston Farm, on the W. side of the road. The force observations on the 25th were taken in the field on the opposite side of the road.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Aug. 26	− 1 35	11 4	21 2·1	21 7·2
	− 0 55	11 47	21 2·0	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 24	1	12 27	70 7·7	70 9·1
	2	13 2	70 8·7	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 25 I.	D	11 58		
,, ,,	V	12 36	1·6498	1·6487
,, ,,	V	13 33	1·6502	
,, 26 II.	V	12 2	1·6555	1·6542

100. Glamis. June 7, 1892; G. (60, 74). Lat. 56° 37′ 32″; Long. 3° 1′ 0″. On a piece of open ground, 250 yards S. of the Railway Station, on the W. side of the road to the village. Signal-box at the Station bore 8° W. of N., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 29	13 53	20 7·0	20 17·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 50	70 49·1	70 49·8
83 1	15 1	70 47·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 26		
V	14 6	1·6110	1·6081

101. **Glasgow.** See "1890 Memoir," p. 112.

102. **Glen Afric.** August 11, 1891 ; T. (61, 99). Lat. 57° 20′ 38″; Long. 4° 46′ 12″.
150 yards S.W. of the Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 5 +0 34	12 40	21 1·3	21 6·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 28	71 35·8	71 36·4
1	13 42	71 35·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 19	1·5594	1·5582

103. **Glencaird.** Aug. 3, 1892; W. (70, 94). Lat. 55° 4′ 27″; Long. 4° 34′ 0″. In the field to the S.E. of the point where the road to Glen Trool Lodge leaves the main road. About 100 yards from either road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 51	11 57	20 31·4	20 43·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 35	70 8·4	70 10·2
2	13 48	70 8·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 52		
V	12 10	1·6527	1·6494

104. **Glen Tilt** (1). June 10 and 11, 1892; G. (60, 74). Lat. 56° 50′ 35″; Long. 3° 45′ 28″. Twenty yards W. of the road from Blair Athol to Forest Lodge, and about $\frac{1}{3}$ mile from the latter, the stables of which bore 35° E. of N., about 250 yards distant.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
June 11	+0 44	12 42	20 29·5	20 40·1

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
June 10	1	12 39	70 37·6	70 38·6
	83 1	12 51	70 36·8	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
June 10	D	12 13	1·6321	1·6292
	V	11 50		

105. **Glen Tilt** (2). July 8, 1892 ; G. (60, 74). Lat. 56° 57′ 42″ ; Long. 3° 38′ 2″. By the left bank of the river, just below the junction of the Bynach Burn with the Geldie ; about 1 mile N.N.E. of Bynach Lodge, and ¼ mile from a cottage, which bore 18° N. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 2 26	15 0	20 13·9	20 25·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 34	70 50·2	70 50·5
83 1	15 49	70 47·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 9	1·6122	1·6092

106. **Glenwhilly.** July 22, 1892. W. (70, 94). Lat. 54° 59′ 54″; Long. 4° 51′ 23″. About 300 yards E.S.E. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 39	13 13	20 38·2	20 49·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 40	70 5·4	70 7·7
2	14 53	70 6·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 3	1·6567	1·6534
V	13 32		

107*a*. **Golspie.** See "1890 Memoir," p. 113.

107*b*. **Golspie.** June 18, 1892; G. (60, 74). Lat. 57° 58′ 42″; Long. 3° 57′ 52″. In a field behind the Sutherland Arms Hotel; 50 yards N.N.W. of the Bank, and 80 yards from some Cottages.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	11 7	20 43·0	20 54·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
 1 83 1	h. m. 12 13 12 26	° ′ 71 43·0 71 42·8	° ′ 71 44·2

Horizontal Force.

G.M.T.		H.	H_0.
 D V	h. m. 11 43 11 16	1·5491	1·5461

108. Grant's House. May 26, 1892; G. (60, 74). Lat. 55° 53′ 2″; Long. 2° 18′ 12″. In a field on the N. side of the Railway, and about 250 yards from the Station, which bore 30° W. of S. The Free Church Minister's House bore 10° E. of S., about 80 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 42	h. m. 14 2	° ′ 19 28·4	° ′ 19 38·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
 2 1	h. m. 14 54 15 5	° ′ 70 22·4 70 23·5	° ′ 70 24·4

Horizontal Force.

G.M.T.		H.	H_0.
 D V	h. m. 14 32 14 12	1·6379	1·6352

109. GREENLAW. June 6, 1891; W. (70, 94). Lat. 55° 41′ 58″; Long. 2° 23′ 58″. In a field at Thirlington, to the N. of the road leading to Eccles Toft Farm, near the point at which the stream crosses the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 2 30	11 15	19 35·2	19 38·4
+ 2 40			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 55	70 12·3	70 12·7
2	13 21	70 12·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 5		
V	11 32	1·6480	1·6472

110. GRETNA GREEN. September 4, 1891; W. (70, 94). Lat. 55° 0′ 23″; Long. 3° 3′ 40″. Near the centre of the second field to the E. of the road which runs N.N.W. from the cottages at the corner where the road to Springfield turns E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h m.	h. m.	° ′	° ′
− 1 39	11 3	19 50·4	19 55·7
+ 2 45	15 20	19 50·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0
	h. m.	° ′	° ′
1	14 2	69 55·8	69 57·2
2	14 23	69 56·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 1		1·6638
V	11 27	1·6659	
V	15 31	1·6642	

111. **Halkirk.** June 24, 1892; G. (60, 74). Lat. 58° 30′ 16″; Long. 3° 29′ 13″. In a field S. of the Railway, about 120 yards from the Station, the clock at which bore 30° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 54	13 25	20 40·4	20 52·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 22	71 53·2	71 54·7
83 1	14 34	71 53·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m		
D	14 0		
V	13 38	1·5331	1·5301

112. **Hamilton.** August 12, 1891; W. (70, 94). Lat. 55° 46′ 32″; Long. 4° 1′ 15″. In the field on the West bank of the river Avon, and to the East of the Avenue leading to Hamilton Palace.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 13	12 49	20 27·7	20 32·5

Inclination

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 2	70 21·8	70 23·0
2	14 27	70 22·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 0	1·6424	1·6413

113. **Hawick.** See "1890 Memoir," p. 114.

114. **Helmsdale.** June 30, 1891; W. (70, 94). Lat. 58° 8′ 18″; Long. 3° 40′ 22″. About 200 yards N.W. of the Shepherd's Cottage at Caen.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m	h. m.	° ′	° ′
−1 8	11 41	20 56·4	21 0·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 12	71 57·6	71 58·1
2	13 40	71 57·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27		
V	11 56	1·5308	1·5300

115. **Heriot.** June 4 and 5, 1891; W. (70, 94). Lat. 55° 46′ 50″; Long. 2° 57′ 25″. In the field through which the road to Shoestanes passes, due W. of the Railway Station.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
June 5 . . .	+3 32	13 54	19 50·1	19 53·2
,, 5 . . .	+2 4			
,, 5 . . .	+3 5			

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
June 4 . . .	1	13 54	70 19·1	70 19·3
	2	14 20	70 18·4	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
June 4 . . .	D	15 56		
,, 4 . . .	V	15 20	1·6410	1·6404
,, 4 . . .	V	16 28	1·6414	

116. L. HOURN. Aug. 1, 1889; T. (61, 83). Lat. 57° 7′ 0″; Long. 5° 25′ 1″. About 1 mile from Loch Hourn Head. On the N. shore of the Loch, near a stream running from Carn More. School House at Skiary bearing 23° W. of S. Eilan Mousker bearing 22° S. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 9	+15 49	21 56·2	21 45·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 12	71 27·6	71 25·2
2	17 28	71 26·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	18 2	1·5667	1·5697
V	15 34	1·5667	

117. HUNTLY. Aug. 8, 1891; W. (70, 94). Lat. 57° 26′ 58″; Long. 2° 47′ 26″. In the first field on the N. side of the road to Milltown.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 54	13 32	20 41·5	20 45·4
+4 26	17 3	20 39·8	

Inclination.

Needle.	G.M.T.	θ	θ_0.
	h. m.	° ′	° ′
1	15 4	71 8·2	71 8·7
2	15 27	71 7·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 17		
V	13 45	1·5874	1·5854
V	17 15	1·5856	

118. **Inchmarnock.** Sept. 25, 1891 ; T. (61, 99). Lat. 55° 48′ 16″; Long. 5° 9′ 41″. Near the shore at the E. end of Inchmarnock.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 25	13 55	20 59·3	21 5·1

119. **Loch Inver.** See "1890 Memoir," p. 114.

120. **Inverary.** September 19, 1891 ; T. (61, 99). Lat. 56° 14′ 37″; Long. 5° 3′ 25″. At the head of the Loch, about a mile to the N. of Inverary. To the N. of a small cottage, and between the Dalmally Road and the shore.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 45	10 56	21 7·8	21 13·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	11 43	70 43·0	70 44·8
1	11 57	70 44·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 7	1·6131	1·6118

121. INVERNESS. See "1890 Memoir," p. 115.

122. INVERURIE. August 7, 1891; W. (70, 94). Lat. 57° 16′ 43″; Long. 2° 22′ 29″. In the field to the W. of the "Kintore Arms" Hotel, about 10 yards S. of a clump of trees; the Manse bore N.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 14	11 25	20 32·5	20 37·8
+1 16	13 54	20 33·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 34	71 2·4	71 3·4
2	12 58	71 3·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 42		1·5966
V	11 44	1·5981	
V	14 8	1·5973	

123. IONA. See "1890 Memoir," p. 116.

124. JEDBURGH. May 30, 1891. W. (70, 94). Lat. 55° 28′ 28″; Long. 2° 32′ 52″. In a field on the top of the hill to the E. of the town; the Abbey bearing W.N.W., and the monument on Penielheugh N. by W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 47	10 52	19 23·8	19 27·5
+2 0	14 36	19 24·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 56	70 5·5	70 6·3
2	13 21	70 6·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 34	1·6585	1·6577
V	16 0		

125. KEITH. July 1, 1892; G. (60, 74). Lat. 57° 32′ 22″; Long. 2° 57′ 13″. In a field behind the R.C. Chapel, the house at the W. end of which bore E.S.E., about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 52	10 42	21 0·5	21 11·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 40	71 14·6	71 16·2
83 1	11 53	71 14·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 13	1·5837	1·5807
V	10 52		

126. **Kelso.** May 24, 1892; G. (60, 74). Lat. 55° 36′ 32″; Long. 2° 25′ 56″. In a field S. of the racecourse; the Grand Stand bore 28° W. of N., about $\frac{1}{3}$ mile distant. 200 yards E. of a turning out of the lane leading to the course.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 39	10 45	19 52·5	20 2·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 59	70 26·7	70 27·8
2	11 48	70 25·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 24	1·6383	1·6355
V	10 57		

127. **Kennethmont.** July 5, 1892 ; G. (60, 74). Lat. 57° 21′ 6″ ; Long. 2° 44′ 22″. In the field on the S. side of the Railway ; the Signal-box at the east end of the station bore due N., about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 29	h. m. 14 24	° ′ 20 10·3	° ′ 20 21·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 7	71 27·8	71 28·7
83 1	15 18	71 26·6	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 14 35	1·5628	1·5599

128. **Kilconquhar.** July 21, 1892 ; G. (60, 74). Lat. 56° 12′ 8″ ; Long. 2° 50′ 28″. In a field on the S. side of the Railway ; the Station bore N.N.W., about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 51	h. m. 16 17	° ′ 19 50·6	° ′ 20 1·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 48	70 34·4	70 36·1

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 28	1·6233	1·6202

129. Kildonan. June 20, 1892; G. (60, 74). Lat. 58° 10′ 14″; Long. 3° 51′ 54″. On the rough open land E. of the Railway; the south end of the Station buildings bore 15° N. of W., about 120 yards distant; bridge over the river 5° N. of W., 50 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 9	12 8	20 38·0	20 49·6

Inclination.

Needle.	G.M.T.	δ.	δ_0.
	h. m.	° ′	° ′
1 83 1	13 7 13 19	71 44·3 71 43·7	71 45·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	12 40 12 18	1·5433	1·5403

130. **Killin.** July 23, 1891; W. (70, 94). Lat. 56° 28′ 8″; Long. 4° 19′ 5″. Near the centre of the field to the S. of the Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 33	11 27	20 50·8	20 55·4
+1 2	13 51	20 51·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 45	70 48·0	70 49·4
2	15 10	70 49·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		
V	11 47	1·6032	1·6028
V	14 4	1·6044	

131. **Kinbrace.** June 21, 1892; G. (60, 74). Lat. 58° 15′ 37″; Long. 3° 56′ 27″. 140 yards from the Railway Station, which bore 40° E. of S., and 30 yards E. of the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 19	12 23	20 56·4	21 8·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 20	71 45·0	71 46·3
83 1	13 31	71 45·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 56		
V	12 34	1·5456	1·5426

132. Kingussie. June 20, 1891; W. (70, 94). Lat. 57° 4′ 58″; Long. 4° 2′ 58″. In a field near the top of the hill on the N. of the town; Kerra bearing N.N.E., Gordon Hall Farm S.E. by S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 51	16 44	20 30·1	20 35·2
+6 55	18 31	20 32·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 32	70 57·3	70 58·0
2	17 59	70 57·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	19 42		
V	16 57	1·6032	1·6038
V	18 45	1·6051	

133. **Kinloch Aline.** September 4, 1891 ; T. (61, 99). Lat. 56° 33′ 49″ ; Long. 5° 44′ 55″. On the path to the W. of the Castle.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 48	15 29	21 25·2	21 30·6

Inclination.

Needle.	G.M T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 13	71 4·8	71 5·8
2	16 2	71 5·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 40	1·6009	1·5996

134. **Kinloch Eil.** September 7, 1891 ; T. (61, 99). Lat. 56° 51′ 18″ ; Long. 5° 17′ 1″. In a field to the N. of the Loch ; about half-way between the Road and the Shore, and close to Corrybeg Crofts.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 26	12 57	21 23·4	21 29·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 27	71 17·6	71 18·9
2	12 40	71 18·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 9	1·5831	1·5818

135. KINLOCHEWE. August 3, 1892; T. (61, 83). Lat. 57° 36′ 16″; Long. 5° 17′ 53″. About 40 yards in front of the Hotel, and on the left bank of the river Garry.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 23	15 26	21 24·1	21 36·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	12 35	71 34·7	71 35·1
3	12 59	71 32·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 56		
V	14 35	1·5640	1·5607

136. KINROSS. June 11, 1891; W. (70, 94). Lat. 56° 12′ 20″; Long. 3° 25′ 5″. In a field to the E. of the town, and on the S. side of the cross-road opposite Kirkland's Hotel, the Church bearing S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 48	10 58	20 2·7	20 6·6
+2 0	14 42	20 3·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 1	70 38·4	70 38·6
2	13 28	70 37·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 58	1·6253	1·6246
V	11 26		
D	15 32	1·6254	
V	14 59		

137. **Kirkcaldy.** July 22, 1892; G. (60, 74). Lat. 56° 6′ 40″; Long. 3° 9′ 28″. On the lawn behind Whyte House, the residence of Mrs. **Beveridge**; 50 yards from the entrance-porch, which bore 15° S. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 31	11 2	19 58·5	20 9·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 50	70 44·0	70 45·7
83 1	11 53	70 43·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 36	1·6141	1·6110
V	11 16		

138. KIRKCUDBRIGHT. August 5, 1892; W. (70, 94). Lat. 54° 50′ 8″; Long. 4° 3′ 24″. On the alluvial ground to the W. of the town, 100 yards N.N.W. of the Academy School.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 45	10 54	20 6·1	20 17·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 3	69 51·9	69 53·7
2	12 18	69 51·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 32	1·6728	1·6695
V	11 8		

139. KIRKWALL. See "1890 Memoir," p. 116.

140. KIRRIEMUIR. July 25, 1891; W. (70, 94). Lat. 56° 40′ 42″; Long. 3° 0′ 15″. In a field N. of the town, on the E. side of the road to Northmuir, and N. of the road leading to the top of the Hill of Kirriemuir.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 47	11 50	20 13·8	20 18·2
+1 48	14 31	20 13·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 59	70 45·7	70 46·6
2	13 27	70 46·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 23		
V	12 12	1·6136	1·6121
V	14 43	1·6125	

141*a*. KYLE AKIN. See "1890 Memoir," p. 117.

141*b*. KYLE AKIN. July 20 and 23, August 10 and 19, 1892; T. (61, 83). Lat. 57° 16′ 26″; Long. 5° 44′ 12″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 20 . .	−1 13	10 34	22 15·5	
July 20 . .	+1 33	13 46	22 15·6	
July 23 . .	−1 19	11 33	22 19·6	22 29·2
Aug. 10 . .	−1 16	11 35	22 16·0	
Aug. 19 . .	−1 4	10 43	22 16·3	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 10 . .	2	12 12	71 35·6	71 36·5
	3	12 42	71 33·9	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 20 . .	V	10 54	1·5561	1·5533
July 23 . .	D	10 44		
July 23 . .	V	11 56	1·5603	
Aug. 19 . .	V	10 59	1·5534	

142*a*. LAIRG. See "1890 Memoir," p. 118.

142*b* and *c*. LAIRG (*b*) and (*c*). June 14, 1892; G. (60, 74). Lat. 58° 1′ 20″; Long. 4° 24′ 2″. B. About 100 yards S. of the hotel; flagstaff on the top of a small hill bore due E., about 50 yards distant. C. 30 yards S. of B. The value of H obtained at station C was alone used in calculating the Disturbing Forces.

Declination.

Σ.		G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
b	−1 3	11 26	21 7·7	21 19·0
c	+2 41	13 53	21 6·6	21 17·9

Inclination.

Needle.		G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
b	1	12 27	71 48·7	71 49·1
	83 1	12 54	71 46·5	
c	83 1	14 32	71 45·8	71 47·3

Horizontal Force.

G.M.T.			H.	H_0.
		h. m.		
b	D	12 0		
b	V	11 36	1·5424	1·5395
c	V	14 4	1·5437	1·5408

143. **Langholm.** August 3, 1892; G. (60, 74). Lat. 55° 9′ 20″; Long. 3° 0′ 0″. In the Duke of Buccleuch's grounds, just N. of the town; lodge at the entrance bore 15° W. of N., 80 yards distant; church spire S.S.E., about $\frac{1}{3}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 54	h. m. 10 38	° ′ 19 37·9	° ′ 19 49·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 34	69 58·4	69 59·9
83 1	11 44	69 57·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 10		
V	10 49	1·6645	1·6613

144. **Leadburn.** July 23, 1892; G. (60, 74). Lat. 55° 47′ 8″; Long. 3° 13′ 6″. In a field on the E. side of the railway; the signal-box at the station bore 50° W. of N., 200 yards distant. Railway bridge 30° S. of W., about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +0 46	h. m. 12 22	° ′ 19 29·9	° ′ 19 41·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 21	70 23·8	70 25·2
83 1	13 30	70 23·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 51		
V	12 32	1·6395	1·6364

145. Lerwick. See "1890 Memoir," p. 118.

146. Loch Leven. August 7, 1891; T. (61, 99). Lat. 56° 42′ 9″; Long. 5° 3′ 8″. On the S. side of L. Leven, and near the narrows at the end of the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 47	14 26	21 26·1	21 30·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 0	70 39·1	70 39·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 37	1·6285	1·6274

147. **Lochgoilhead.** See "1890 Memoir," p. 119.

148. **Loch Lochy.** August 9, 1891; T. (61, 99). Lat. 56° 57′ 11″; Long. 4° 55′ 17″. On the bank, near the mouth of the River Gloy.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 30	11 11	21 43·0	21 46·6
+1 1	13 14	21 40·4	

Inclination.

Needle.	G.M.T.	θ.	δ_0.
	h. m.	° ′	° ′
1	12 12	71 12·7	71 13·8
2	12 25	71 13·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 53		
V	11 26	1·5944	1·5933

149. **Lockerbie.** August 14, 1891; W. (70, 94). Lat. 55° 7′ 21″; Long. 3° 21′ 28″. In the first field on the N. side of the road to Dumfries; church bearing N.N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 36	12 7	19 58·7	20 3·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 17	69 57·9	69 58·4
2	13 40	69 57·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 33		1·6655
V	12 40	1·6669	
V	15 7	1·6664	

150. Lowlander's Bay (L. Skiport). August 13, 1889; T. (61, 83). Lat. 57° 19′ 36″; Long. 7° 16′ 18″. On the high ground to the S. of the creek in Lowlander's Bay, near the shepherd's hut which forms the leading-in mark for the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 29	11 14	23 59·4	23 48·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 39	71 25·3	71 23·5
2	12 56	71 24·7	

Horizontal Force.

G.M.T		H.	H_0.
	h. m.		
V	11 28	1·5611	1·5641

151. Lowlandman's Bay, Jura. July 30, 1891; T. (61, 99). Lat. 55° 53′ 5″; Long. 5° 54′ 0″. On the W. side of the Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 52	15 49	22 8·9	22 12·7
	17 39	22 7·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 32	70 34·0	70 34·8
1	16 48	70 33·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 14		
V	16 0	1·6305	1·6294

152. McCormack Bay, L. Skiport. August 13, 1889; T. (61, 83). Lat. 57° 20′ 0″; Long. 7° 15′ 48″. Near the shore on a small creek in the N.W. corner of the Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 17	16 5	22 14·3	22 2·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 12	1·5577	1·5612
V	16 37	1·5586	

153*a*. Loch Maddy. See "1890 Memoir," p. 120.

153*b*. Loch Maddy. August 16, 1889; T. (61, 83). Lat. 57° 36′ 0″; Long. 7° 9′ 36″. To the east of the road from the Loch Maddy Hotel to the Pier, and about equidistant from the two places.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 13	11 51	22 54·9	22 42·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 9	1·5535	1·5565

154. Mallaig. August 16 and 17, 1892; T. (61, 83). Lat. 57° 0′ 19″; Long. 5° 49′ 17″. On the S.E. side of the Bay. On a path close to the shore, and half-way between two cottages.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	′ °	° ′
Aug. 17	−2 31	10 21	22 8·4	22 21·1

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 17	2	11 42	71 28·1	71 29·1
,, 17	3	11 54	71 26·4	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 17	D	11 12		
„ 17	V	10 36	1·5601	1·5569
„ 16	V	17 51	1·5604	

155. L. **Melfort.** July 31, 1891; T. (61, 99). Lat. 56° 16′ 7″; Long. 5° 30′ 32″. On the W. side of Fearnach Bay, and close to the shore.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 40	14 34	21 8·7	21 15·1
	16 21	21 12·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 19	70 37·7	70 38·2
2	15 33	70 37·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 58		
V	14 46	1·6241	1·6230

156. **Moffat.** July 28, 1892; G. (60, 74). Lat. 55° 19′ 55″; Long. 3° 26′ 44″. In a field behind the "Annandale Arms" Hotel, between the town and the river; 200 yards E. of the latter, and 120 yards N. of a road running down to it from the High Street. The spire of a Church near the Railway Station bore 30° E. of S., about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 56	10 41	20 4·8	20 16·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 38	70 5·9	70 8·0
83 1	11 47	70 6·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 16	1·6555	1·6523
V	10 54		

157. MONIKIE. June 8, 1892; G. (60, 74). Lat. 56° 32′ 12″; Long. 2° 48′ 37″. In a field N. of the Railway; signal-box at the Station bore 8° W. of S., about 120 yards distant, 15 yards W. of a small stream.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 41	12 31	19 27·4	19 37·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 26	70 42·1	70 42·3
83 1	13 37	70 39·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 5	1·6212	1·6185
V	12 45		

158. **Montrose.** July 27, 1891; W. (70, 94). Lat. 56° 43′ 24″; Long. 2° 27′ 18″. On the Links, about 150 yards N.E. of the Powder Magazine. Beacon bearing S.S.E., and Parish Church S. by. W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 54	11 47	19 43·7	19 48·6
	11 58	19 44·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 2	70 46·9	70 47·4
2	14 30	70 46·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 16	1·6121	1·6111

159. **L. More.** June 16, 1892; G. (60, 74). Lat. 58° 15′ 55″; Long. 4° 49′ 0″. By the side of the road, about one mile S. of Loch More. Kynloch Cottage bore 22° W. of N., about 300 yards distant; stone bridge over the burn 15° W. of N., about 90 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 20	16 47	21 16·2	21 27·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
83 1	17 21	71 41·5	71 42·8

Horizontal Force.

G.M.T.		H.	H_0.
V	° ′ 17 6	1·5465	1·5435

160. L. Nevis. September 1, 1889 ; T. (61, 83). Lat. 56° 59′ 0″ ; Long. 5° 35′ 54″. On the S. shore of the Loch, half a mile beyond the narrows.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 15	11 52	22 23·2	22 11·3
+1 22	13 54	22 20·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 18	71 24·9	71 24·7
2	13 30	71 27·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 48	1·5680	1·5703
V	11 33	1·5671	

161. New Cumnock. August 17 and 18, 1891; W. (70, 94). Lat. 55° 23′ 50″; Long. 4° 11′ 12″. In a field to the W. of the village. The Established Church bore E.S.E., and the Free Church N.E.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Aug. 18	−1 29	11 11	20 19·8	20 25·0
	−1 1	11 44	20 20·5	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 17	1	11 20	70 14·4	70 15·4
	2	11 51	70 14·7	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 17	D	13 21		1·6450
„ 17	V	14 47	1·6454	
„ 17	V	14 1	1·6463	
„ 18	V	12 2	1·6468	

162. New Galloway. September 2, 1891; W. (70, 94). Lat. 55° 5′ 7″; Long. 4° 6′ 58″. About 300 yards E.N.E. of Balmaclellan Manse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 4	11 32	20 16·3	20 20·8
+1 58	14 37	20 15·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 17	70 5·5	70 7·1
2	13 41	70 7·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 18		
V	11 47	1·6599	1·6570
V	14 48	1·6574	

163. Newmilns. August 19, 1891; W. (70, 94). Lat. 55° 36′ 24″; Long. 4° 17′ 30″. Near the centre of the field at the end of a bye-road which leads towards the river at the E. end of Darvel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 16	11 31	20 46·2	20 51·3
+1 46	14 42	20 46·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 4	70 43·9	70 45·0
2	13 30	70 44·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 59		
V	12 4	1·6295	
V	14 57	1·6279	1·6273
V	15 13	1·6278	

164*a* and *b*. NEWTON STEWART. August 29 and 31, 1891; W. (70, 94). Lat. 54° 57′ 31″; Long. 4° 29′ 31″. (*a*) In a field to the S. of the road leading past Penninghame Church, which bore due E., about 400 yards distant. (*b*) About 400 yards N. of the former position.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Aug. 29 (*a*)	−1 48	11 0	20 30·7	20 36·1
	+0 55	13 44	20 31·2	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 29 (*a*)	1	12 13	70 4·9	70 6·3
	2	12 42	70 5 9	
Aug. 31 (*b*)	1	12 13	70 4·5	70 6·5
	2	12 58	70 6·7	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 29 (*a*)	V	11 21	1·6620	1·6617
	V	14 16	1·6639	
Aug. 31 (*b*)	V	14 9	1·6584	1·6571

165*a*. OBAN. See "1890 Memoir," p. 120.

165*b*. OBAN (Kerrera). See "1890 Memoir," p. 121.

166. Ord, L. Eishort. September 10, 1892; T. (61, 83.) Lat. 57° 8′ 45″; Long. 5° 56′ 30″. On the S. Side of the Burn; and near a ruined cottage. Ord House bore about N. and was $\frac{1}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 16	h. m. 14 2	° ′ 22 22·2	° ′ 22 35·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	14 41	71 26·7	71 27·9
3	14 52	71 25·4	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 14 12	1·5680	1·5644

167. Ornsay (Skye). August 19, 1891; T. (61, 99.) Lat. 57° 8′ 48″; Long. 5° 47′ 29″. On the S.W. corner of the Island, and about 50 yards from high-water mark.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +4 31	h. m. 17 18	° ′ 21 32·1	° ′ 21 37·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	h. m.	° ′
1	18 6	71 56·7	71 57·3
2	17 56	71 56·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 29	1·5352	1·5340

168. ORONSAY. September 21, 1892 ; T. (61, 83). Lat. 56° 1′ 1″ ; Long. 6° 13′ 59″.
On the rising ground near the shore.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 0	15 39	21 47·4	22 0·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 22	70 57·0	70 58·6
3	16 36	70 55·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 51	1·6049	1·6013

169. OVERSCAIG INN. July 9, 1891 ; W. (70, 94). Lat. 58° 10′ 5″ ; Long. 4° 41′ 35″.
About half-way between the Hotel and the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 2	13 51	21 12·7	21 16·8
+2 27	15 10	21 12·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 17	71 50·7	71 51·3
2	11 45	71 50·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 58		1·5529
V	12 24	1·5533	
V	14 4	1·5542	

170. Parton. August 4, 1892; W. (70, 94). Lat. 55° 0′ 34″; Long. 4° 2′ 48″. At the N. corner of the field which lies to the N. of the farmhouse, which is itself about 50 yards N. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 16	20 12·1	20 23·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 34	70 0·8	70 2·9
2	12 49	70 1·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 7		
V	11 43	1·6614	1·6581

171. **Peebles.** June 3, 1891; W. (70, 94). Lat. 55° 37′ 56″; Long. 3° 10′ 58″. In the field to the N. of the branch road leading to Bonnington Farm, which bore S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 24	11 28	19 59·3	20 2·6
+2 29	15 3	19 59·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 19	70 14·8	70 15·7
2	13 47	70 15·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 24		1·6446
V	11 45	1·6458	
D	15 45		
V	15 14	1·6450	

172. **Penwherry.** July 23, 1892; W. (70, 94). Lat. 55° 8′ 50″; Long. 4° 49′ 50″. 300 yards from the Railway Station, which bears 59° to the W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 21	20 37·7	20 49·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 43	69 50·3	69 52·4
2	11 57	69 50 6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 43	1·6919	1·6886
V	12 14		

173. PERSIE HOTEL. June 4, 1892 ; G. (60, 74). Lat. 56° 40′ 48″ ; Long. 3° 24′ 20″. 30 yards W. of the Braemar Road, and 180 yards from the Persie Hotel, which bore 20° E. of S., 10 yards N. of a bye-lane, and about 200 yards distant from a small church, which bore 80° S. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 8	11 20	20 17·7	20 28·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 14	71 1·1	71 2·6
83 1	12 25	71 0·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 53	1·5902	1·5873
V	11 30		

174. PERTH. June 13, 1891; W. (70, 94). Lat. 56° 25′ 12″; Long. 3° 28′ 28″. Near the centre of a field S. of the river Almond, and due E. of Lawgrove House.

(NOTE.—The force observations in the afternoon were made at a point about 200 yards W. of the earlier station.)

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 11	11 33	20 9·9	20 13·8
+1 57	14 58	20 10·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 51	70 46·4	70 46·6
2	13 14	70 45·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 58		
V	11 50	1·6091	1·6078
V	15 21	1·6081	

175. PINVALLEY. July 25, 1892; W. (70, 94). Lat. 55° 13′ 15″; Long. 4° 37′ 20″. 100 yards S.S.E. of the house marked Pinvalley on the Ordnance Map.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 43	13 20	20 52·4	21 4·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 52	70 2·4	70 4·6
2	13 36	70 2·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 19	1·6705	1·6672
V	13 54		

176. Pitlochrie. See "1890 Memoir," p. 122.

177. Poolewe. August 25, 1891; T. (61, 99). Lat. 57° 46′ 5″; Long. 5° 36′ 20″. On a raised beach near the shore at the head of the Bay and 50 yards E. of a small stream. About $\frac{1}{4}$ mile to the W. of the "Observation Spot" of the Hydrographic Survey of 1849–51.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 53	10 52	21 33·0	21 38·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 47	71 41·8	71 41·8
2	11 33	71 40·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V.	11 4	1·5460	1·5448

178. Port Askaig (Islay). See "1890 Memoir," p. 122.

179. Port Ellen. September 13, 1891; T. (61, 99). Lat. 55° 37′ 30″; Long. 6° 11′ 5″. To the S. of the town, and on the Ard.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 6	14 42	21 34·2	21 39·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	15 24	70 17·4	70 18·6
1	15 39	70 17·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 54	1·6558	1·6545

180. Port of Ness. August 29, 1889; T. (61, 83). Lat. 58° 29′ 24″; Long. 6° 13′ 30″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 17	13 59	23 1·8	22 50·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 38	72 8·2	72 6·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 12	1·5217	1·5245

181. Port Patrick. August 27, 1891; W. (70, 94). Lat. 54° 51′ 0″; Long. 5° 6′ 33″. In the field to the W. of the bye-road leading to Dunskay House Farm, just beyond the point at which it leaves the Stranraer Road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 46	15 27	20 49·5	20 54·7
+4 7	16 45	20 49·7	

Inclination.

Needle.	G.M T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 39	70 4·1	70 5·2
2	14 23	70 4·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 38		
V	12 5	1·6594	1·6575
V	16 10	1·6582	

182*a*, *b*, and *c*. Portree. See "1890 Memoir," p. 123.

183. **RAASAY, POINT OF AYRE.** August 27, 1892; T. (61, 83). Lat. 57° 20′ 7″; Long. 6° 1′ 10″. About 300 yards N. of the Point of Ayre, on the S. shore of RAASAY, and close to the beach.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 20	h. m. 16 14	° ′ 23 4·8	° ′ 23 18·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
3	h. m. 16 54	° ′ 71 51·1	° ′ 71 52·9

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 16 25	1·5280	1·5245

184. **LOCH RANNOCH.** June 18 and 19, 1891; W. (70, 94). Lat. 56° 41′ 30″; Long. 4° 24′ 40″. On the level ground in front of the cottage which stands near the E. end of the Bridge of Ericht, at the W. end of the Loch.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
June 19	h. m. −2 21 −2 5 +2 12	h. m. 10 56 14 58	° ′ 21 37·8 21 38·3	° ′ 21 41·9

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
June 18	1 2	h. m. 13 43 13 8	° ′ 70 50·8 70 49·9	° ′ 70 50·9

Horizontal Force.

Date.	G.M.T.		H.	H_0.
June 19	D V	h. m. 12 8 11 23	1·6089	1·6081

185*a*. Loch Ranza (*a*). September 24, 1891; T. (61, 99). Lat. 55° 42′ 23″. Long. 5° 18′ 0″. 100 yards to the S. of the Pier, and within 25 yards of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 3	h. m. 15 38	° ′ 20 58·6	° ′ 21 4·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1 2	h. m. 16 45 16 58	° ′ 70 53·9 70 53·6	° ′ 70 54·6

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 16 16	1·5984	1·5970

185*b*. LOCH RANZA (*b*). July 27, 1891; T. (61, 99). Lat. 55° 42′ 18″; Long. 5° 17′ 24″. On the promontory, and a few yards to the S. of the Castle.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 47	12 41	21 11·9	21 16·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 49	70 58·8	70 59 5
2	14 4	70 58·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 55	1·5904	1·5893

186. RICCARTON JUNCTION. May 19, 1891; W. (70, 94). Lat. 55° 16′ 12″; Long. 2° 43′ 15″. On the top of the Hill to the E. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 39	11 27	19 37·9	19 39·5
+4 1	15 18	19 35·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 55	69 58·1	69 58·6
2	14 20	69 58·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 12		1·6608
V	11 40	1·6618	
V	15 35	1·6611	

187. Loch Riddan. July 25, 1891 ; T. (61, 99). Lat. 55° 57′ 25″ ; Long. 5° 11′ 54″. 150 yards from Craig Farm-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 12	10 37	21 13·3	21 17·7
−2 8			
−1 17			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	°
1	11 36	70 33·7	70 33·1
2	11 50	70 31·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 50	1·6216	1·6205

188. EAST LOCH ROAG. August 27, 1889; T. (61, 83). Lat. 58° 12′ 30″; Long. 6° 47′ 12″.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 57	72 6·7	72 4·9
2	13 10	72 5·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 42	1·5189	1·5227
V	12 17	1·5197	

189. RODEL, HARRIS. August 17, 1889; T. (61, 83). Lat. 57° 44′ 18″; Long. 6° 57′ 30″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 32	11 24	20 27·0	20 16·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 32	71 36·1	71 34·6
2	12 46	71 36·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 17	1·5695	1·5725
V	11 40		

190. S. Rona (Acarsaid More). August 29, 1892; T. (61, 83). Lat. 57° 32′ 22″; Long. 5° 59′ 10″. At the head of the Harbour, and to the N.W. of the "Widow's Cottage," which was 50 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 12	15 10	22 0·6	22 13·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 20	71 43·9	71 45·1
3	15 58	71 42·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 55	1·5460	1·5425
V	15 21		

191. Ronachan (Cantyre). September 24, 1892; (T. 61, 83). Lat. 55° 44′ 15″; Long. 5° 35′ 43″. On a garden-walk to the W. of the House, which was 35 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 48	10 58	21 5·5	21 19·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 3	70 31·9	70 33·7
3	12 42	70 31·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 56		
V	11 12	1·6318	1·6282

192. Row (Gairloch). See "1890 Memoir," p. 124.

193. Island of Rum. September 9, 1892; T. (61, 83). Lat. 57° 2′ 50″; Long. 6° 17′ 50″. At Ruamil, about one mile S. of Sandanische Point, and close to the shore. On red sandstone rock.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 42	15 21	21 49·2	22 2·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 0	71 36·2	71 38·1

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 30	1·5659	1·5623

194. Ruthwell. July 29, 1892; W. (70, 94). Lat. 55° 0′ 46″; Long. 3° 25′ 0″. In a field to the east of the road leading from the Station past the Post Office, 400 yards from the Station, which bears 56° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 20	14 2	19 50·0	20 1·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 26	69 54·3	69 55·9
2	13 10	69 54·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 21		
V	11 52	1·6692	1·6660

195. St. Andrew's. June 12, 1891; W. (70, 94). Lat. 56° 20′ 23″; Long. 2° 50′ 10″. About 300 yards S.W. of Northbank Farm-house; Balgone Farm bearing due N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 19	11 27	20 7·2	20 11·0
+2 22	15 6	20 7·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 20	70 36·4	70 37·1
2	13 49	70 36·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 21		1·6211
V	11 46	1·6238	
V	15 21	1·6200	

196. St. Mary's Loch. June 2, 1891; W. (70, 94). Lat. 55° 28′ 25″; Long. 3° 11′ 50″. In the field between Tibby Shiels' Inn and the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 55	12 31	20 0·4	20 3·8
+2 8	15 3	20 0·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 38	70 7·9	70 8·1
2	14 15	70 7·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 44	1·6544	1·6533
V	15 14	1·6537	

197. St. Ninian's Bay, Bute. July 25, 1891; T. (61, 99). Lat. 55° 48′ 15″; Long. 5° 8′ 6″. On the Promontory to the West of the Bay.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 27	70 41·9	70 42·7

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 2	1·6153	1·6142

198. Salen, L. Sunart. August 18, 1891; T. (61, 99). Lat. 56° 42′ 33″; Long. 5° 46′ 40″. On the roadside at the W. side of the Bay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 52	12 42	21 24·8	21 28·6
+3 10	15 47	21 22·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	15 12	71 4·9	71 6·0
1	15 26	71 5·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 45		
V	12 54	1·5978	1·5966

199. SANDAG BAY (L. Hourn). August 17, 1892; T. (61, 83). Lat. 57° 10′ 11″; Long. 5° 41′ 19″. At the head of the Bay, about 50 yards from the shore, and to the left of the burn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +4 42	h. m. 16 1	° ′ 22 59·9	° ′ 23 8·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 40	71 34·5	71 35·4
3	16 54	71 32·7	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 16 13	1·5620	1·5586

200. SANQUHAR. July 27, 1892; W. (70, 94). Lat. 55° 21′ 58″; Long. 3° 55′ 30″. Near the centre of the field, about 200 yards S.S.W. of the Town Hall.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 26	h. m. 14 40	° ′ 20 8·3	° ′ 20 20·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 0	70 12·1	70 14·3
2	14 15	70 12·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 25	1·6501	1·6468

201. Scarnish (Tiree). See "1890 Memoir," p. 125.

202. Scoraig, Little L. Broome. August 27, 1891; T. (61, 99). Lat. 57° 54′ 38″; Long. 5° 22′ 36″. On the beach near some boat sheds.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 30	11 10	20 40·5	20 46·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 56	71 36·4	71 36·8
2	11 45	71 35·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 22	1·5812	1·5800

203. Scourie. July 10, 1891; W. (70, 94). Lat. 58° 21′ 5″; Long. 5° 8′ 43″. In a field S. of the road to Laxford and E.N.E. of the village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 50 +3 6	15 56	23 49·4	23 53·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 48	71 53·7	71 54·1
2	17 15	71 53·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 10	1·5205	1·5211
V	18 33	1·5229	
V	18 50	1·5225	

204. Selkirk. June 1, 1891; W. (70, 94). Lat. 55° 32′ 42″; Long. 2° 50′ 25″. In the grounds of Haining House, half-way between the House and the Cemetery.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 15	11 28	19 39·1	19 42·4
+2 43	15 16	19 39·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 34	70 7·7	70 8·5
2	13 57	70 8·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 2		1·6547
V	15 29	1·6534	
V	11 47	1·6565	
V	12 3	1·6563	

205. L. SHIN (1). June 17, 1892; G. (60, 74). Lat. 58° 5′ 40″; Long. 4° 29′ 18″. On a piece of open ground in a small wood, W. of the road; about half-a-mile S. of Shiness House and 300 yards N. of a turning leading to a bridge and to Shiness Quarry. 15 yards N. of a small stream.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 14	h. m. 13 42	° ′ 21 23·4	° ′ 21 35·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 18	71 49·3	71 50·2
83 1	13 28	71 48·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 54	1·5327	1·5297
V	12 34		

206. L. SHIN (2). June 17, 1892; G. (60, 74). Lat. 58° 8′ 30″; Long. 4° 35′ 12″. By the side of the road, about 1 mile below Fiodhaig (or Fiag) Burn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −2 16	h. m. 10 14	° ′ 21 28·6	° ′ 21 40·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	°
1	10 47	71 48·3	71 49·6
83 1	11 0	71 48·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 24	1·5384	1·5354

207. LOCH SLAPIN. September 10, 1892. T. (61, 83). Lat. 57° 12′ 37″; Long. 6° 1′ 55″. At the head of the Loch, on the W. shore close to the road, and 200 yards to the N. of Favlean.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° '	° '
+3 16	9 24	20 33·9	20 46·4

Inclination.

Needle.	G.M.T.	θ.	θ.
	h. m.	° '	° '
2	10 42	71 27·5	71 27·8
3	10 56	71 24·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 12		
V	9 35	1·5798	1·5762

208. L. SLIGACHAN. September 6, 1892; T. (61, 83). Lat. 57° 18′ 39″; Long. 6° 7′ 31″. On the shore to the N. of Glamair, and 200 yards N. of the School House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 32	h. m. 15 18	° ′ 21 30·4	° ′ 21 43·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 28	72 7·8	72 9·3
3	16 6	72 6·9	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 15 30	1·5270	1·5235

209. SOA (Skye). See "1890 Memoir," p. 125.

210. SOA. July 26, 1892; T. (61, 83). Lat. 57° 9′ 48″; Long. 6° 11′ 43″. Near the anchorage and close to the station at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	θ_0.
h. m. −5 41	h. m 7 15	° ′ 22 22·9	° ′ 22 35·4

Inclination.

Needle.	G.M.T.	θ.	δ_0.
	h. m.	° ′	° ′
2	8 12	71 55·9	71 57·2
3	8 28	71 55·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	8 37	1·5228	1·5195

211. L. **Spelve (Mull).** September 3, 1891 ; T. (61, 99). Lat. 56° 21′ 55″ ; Long. 5° 47′ 31″. At the head of the Loch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 45	14 27	21 52·2	21 57·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 51	69 43·9	69 45·4
2	15 39	69 45·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 10	1·7249	1·7236
V	14 38		

212. **Spital of Glenshee.** June 3, 1892; G. (60, 74). Lat. 56° 48′ 42″; Long. 3° 27′ 18″. In a field by the river ; 100 yards due E. of the "Invercauld Arms" Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 6	13 30	19 58·0	20 8·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 42	71 5·3	71 6·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 33		
V	14 7	1·5852	1·5823

213. L. Stack. June 16, 1892; G. (60, 74). Lat. 58° 20′ 27″; Long. 4° 56′ 42″. By the side of the road, about $\frac{3}{4}$ mile above Loch Stack Lodge; Cross on an island in the Loch bore N.N.W., about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 41	12 32	20 46·0	20 57·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
83 1	13 12	71 50·3	71 51·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 44	1·5438	1·5408

214. L. **Staffin.** September 7, 1892 ; T. (61, 83). Lat. 57° 39′ 19″ ; Long. 6° 14′ 19″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+ 0 55	13 40	21 47·2	22 0·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	14 58	71 50·9	71 52·6
3	14 34	71 50·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 56	1·5430	1·5394

215. **Stanley Junction.** June 1, 1892; G. (60, 74). Lat. 56° 29′ 12″; Long. 3° 26′ 22″. In a field S. of the Railway, and 120 yards from the Station, which bore 55° W. of N., 10 yards N. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 9	13 28	20 7·6	20 18·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 13	70 46·5	70 48·1

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 38	1·6132	1·6103

216. **Stirling.** See "1890 Memoir," p. 126.

217. **Stonehaven.** July 28 and 29, 1891; W. (70, 94). Lat. 56° 58′ 1″; Long. 2° 14′ 18″. On the road-side, just to the W. of Farochie Farm.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 29	+0 34 +0 55	12 9 13 34	19 40·0 19 41·4	19 45·2

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 28	1 2	13 16 13 48	70 46·9 70 47·6	70 47·9

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 28	D	12 19		
July 28	V	11 45	1·6141	
July 29	V	12 22	1·6140	1·6131

218*a*. **Stornoway** (Ard Point). See "1890 Memoir," p. 127.

218*b*. **Stornoway Castle.** See "1890 Memoir," p. 128.

219. **Strachur.** See "1890 Memoir," p. 128.

220*a* and *b*. **Stranraer.** See "1890 Memoir," p. 129.

221. Loch Striven. July 24, 1891; T. (61, 99). Lat. 56° 0′ 12″; Long. 5° 7′ 36″. At the head of L. Striven, about one furlong S. of Craigandaive.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 59	70 37·8	70 37·7
2	12 19	70 36·3	

Horizontal Force.

G.M.T.		H.	H_0.
	° ′		
D	14 12		
V	12 57	1·6200	1·6189

222. Strome Ferry. August 22, 1891; T. (61, 99). Lat. 57° 21′ 5″; Long. 5° 33′ 8″. On the hillside, about 200 yards S. of the Station Hotel, and about 100 yards S.E. of the Chapel on the hill.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 23	10 26	22 4·6	22 9·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	°
1	11 10	71 38·2	71 38·8
2	11 22	71 37·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 37	1·5527	1·5515

223. STROMNESS (Orkneys). See "1890 Memoir," p. 130.

224. TAIN. June 26, 1891; W. (70, 94). Lat. 57° 50′ 0″; Long. 4° 6′ 58″. Near the N.E. corner of the field which lies to the N.E. of Meikleferry Railway Station, and S. of the road leading to the Ferry.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 28	20 53·4	20 56·5
+2 18	15 5	20 51·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 37	71 44·0	71 44·8
2	14 3	71 44·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 44		1·5446
V	12 8	1·5460	
V	15 23	1·5447	

225. TALLADALE, L. Maree. August 2, 1892; T. (61, 83). Lat. 57° 40′ 31″; Long. 5° 29′ 42″. About 100 yards S. of the Pier, and 100 yards E. of the Hotel. Close to a little burn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 11	13 19	22 31·2	22 43·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	12 27	71 41·9	71 43·5
3	12 40	71 41 8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 5	1·5418	1·5385

226. Tanera More. August 25, 1891; T. (61, 99). Lat. 58° 0′ 35″; Long. 5° 24′ 10″. Near the Pier. About 50 yards S. of the Fish-curing House (ruin).

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 51	18 29	21 55·9	22 1·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	19 5	72 5·9	72 6·7

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	18 38	1·5095	1·5083

227. E. Loch Tarbert. See "1890 Memoir," p. 130.

228. W. Loch Tarbert (Harris). August 21, 1889; T. (61, 83). Lat. 57° 54′ 0″; Long. 6° 49′ 0″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 27	12 36	23 7·3	22 57·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 33	71 55·7	71 54·1
2	15 48	71 55·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 45	1·5360	1·5386
V	12 51	1·5353	

229. Tarbet. July 20 and 21, 1891; W. (70, 94). Lat. 56° 12′ 12″; Long. 4° 42′ 28″. July 20, near the centre of the field between the hotel and the Loch. July 21, about 10 yards from the former station. The value of H obtained on July 20 was alone used in calculating to Disturbing Forces.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 20	+2 57	15 50	20 54·6	21 3·0
" 21	−0 52	12 9	21 2·2	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 20	1	17 46	70 44·8	70 45·9
	2	18 9	70 45·7	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 20	D	16 53		
,, 20	V	16 5	1·6082	1·6072
,, 21	V	12 22	1·6056	1·6046

230. TEMPLE (URQUHART). August 10, 1891; T. (61, 99); Lat. 57° 20′ 14″; Long. 4° 26′ 42″. On the N. side of Urquhart Bay, and to the W. of the Pier.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 45	18 26	21 8·3	21 13·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	19 17	71 27·2	71 28·5
2	19 3	71 28·3	

Horizontal Force.

G.M.T.		H	H_0.
	h. m.		
V	18 37	1·5704	1·5692

231. THORNHILL. August 15, 1891; W. (70, 94). Lat. 55° 14′ 40″; Long. 3° 45′ 52″. In a field on the W. side of the lane which meets the road to the Railway Station near the schools; Church bearing E.S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0
h. m.	h. m.	° ′	° ′
−1 30	11 15	20 9·5	20 14·5
+1 57	14 46	20 10·0	

Inclination.

Needle.	G.M.T.	θ.	δ_0.
	h. m.	° ′	° ′
1	13 12	70 7·9	70 8·6
2	13 36	70 7·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8		1·6558
V	11 29	1·6558	
V	14 59	1·6582	

232*a*. THURSO. See "1890 Memoir," p. 131.

232*b*. THURSO. June 28, 1892; G. (60, 74). Lat. 58° 35′ 30″; Long. 3° 31′ 8″. On the green by the right bank of the river, about 30 yards above the bridge.

Declination.

Σ.	G.M.T.	δ.	θ_0.
h. m.	h. m.	° ′	° ′
−1 48	10 52	20 45·5	20 57·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 54	71 54·3	71 56·2
83 1	12 7	71 55·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 26		
V	11 3	1·5341	1·5311

233. Loch Torridon. August 23, 1891 ; T. (61, 99). Lat. 57° 32′ 1″ ; Long. 5° 32′ 40″. Near the upper end of the Loch, and on the S. side nearly due W. of Camus Roil. Torridon House bore 22° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 40	15 26	21 43·9	21 48·5
	17 2	21 42·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 18	71 42·8	71 42·9
2	16 5	71 41·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 44		
V	15 37	1·5469	1·5457

234. Torrisdale (Cantyre). July 28, 1891; T. (61, 99). Lat. 55° 34′ 21″. Long. 5° 29′ 21″. In Wipper Bay: about 50 yards from the edge of the water.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 15	10 46	21 18·3	21 21·5
	13 20	21 15·3	

Inclination.

Needle.	G.M.T.	δ.	θ_0.
	h. m.	° ′	° ′
1	12 46	70 32·8	70·32·8
2	13 0	70 31·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 57		
V	10 57	1·6265	1·6254

235. L. Tosgach. August 22, 1891; T. (61, 99). Lat. 57° 22′ 27″; Long. 5° 48′ 32″. At the Head of the Loch, and close to a Foot-path running down to the Shore.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 59	15 50	22 24·1	22 29·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 20	71 36·6	71 35·9
2	17 9	71 33·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 36	1·5574	1·5562

236. Toumintoul. June 22, 1891; W. (70, 94). Lat. 57° 16′ 32″; Long. 3° 26′ 13″. About 2½ miles from the Village on the W. side of the Grantown Road, near the point where it crosses a small stream. Mid-Fodderletter Farm bearing E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 43	13 27	20 27·1	20 31·2
+3 2	15 43	20 27·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 20	71 9·0	71 9·9
2	14 45	71 9·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 34		1·5871
V	13 44	1·5878	
V	15 56	1·5880	

237. Troon. August 21, 1891; W. (70, 94). Lat. 55° 32′ 50″; Long. 4° 37′ 53″. In the field on the N. side of the road to Loans, and on the E. side of Darley Burn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 56	11 54	20 55·2	21 0·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 17	70 4·4	70 5·9
2	13 43	70 5·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 36		
V	12 34	1·6690	1·6663
V	15 14	1·6659	

238. Uig, L. Snizort. September 8, 1892; T. (61, 83). Lat. 57° 35′ 0″; Long. 6° 21′ 38″. Close to the S. shore of the Bay, and to the W. of a Martello Tower on the hill opposite the Inn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−3 11	10 18	24 28·1	24 41·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	11 25	72 6·8	72 8·2
3	11 4	72 5·8	

Horizontal Force.

G.M.T.		H	H_0.
	h. m.		
D	9 56		
V	10 27	1·5178	1·5142

239. ULLAPOOL. July 15, 1891 ; W. (70, 94). Lat. 57° 54′ 18″ ; Long. 5° 9′ 45″. In the field W. of the road leading to Mr. Ross's house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 20	14 18	21 59·7	22 5·0
+3 13	16 6	22 1·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 51	71 55·5	71 56·0
2	13 18	71 55·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 15		
V	14 35	1·5404	1·5392
V	16 19	1·5400	

240. Watcarrick (Eskdale Muir). August 2, 1892; G. (60, 74). Lat. 55° 15′ 0″; Long. 3° 10′ 42″. Twenty yards W. of the road, and about 300 yards S. of the turning to Watcarrick Farm; 120 yards from some cottages, which were hidden by the brow of the hill, and bore about N.N.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 22	13 17	19 51·5	20 3·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 17	70 1·2	70 2·8
83 1	14 29	70 0·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 56		
V	13 33	1·6622	1·6590

241. Whitburn. June 10, 1891; W. (70, 94). Lat. 55° 52′ 0″; Long. 3° 40′ 20″. Near the centre of the field which lies to the S.E. of the School-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 8	11 38	20 37·5	20 41·3
+2 24	15 5	20 38·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 37	70 20·6	70 21·2
2	14 2	70 20·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 48		
V	12 16	1·6515	1·6501
V	15 20	1·6502	

242. **Whithorn.** August 28, 1891; W. (70, 94). Lat. 54° 43′ 45″; Long. 4° 24′ 35.″ Near the S. side of the field at the end of the lane leading past the Gas Works, which bore due N. The High Mains bore S. by W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 52	11 4	20 24·5	20 29·6
+1 45	14 20	20 24·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 48	69 49·3	69 50·4
2	13 11	69 49·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 0		
V	11 19	1·6771	1·6749
V	14 37	1·6750	

243*a*. WICK. See "1890 Memoir," p. 132.

243*b*. WICK. June 29, 1892; G. (60, 74). Lat. 58° 26′ 30″; Long. 3° 5′ 38″. On the lawn in front of "Rosebank." Lodge at the entrance bore S. by E., about 40 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 55	h. m. 10 43	° ′ 20 26·7	° ′ 20 38·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 46	72 0·7	72 2·0
83 1	12 0	72 0·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 17	1·5296	1·5266
V	10 56		

244. WIGTOWN. August 2, 1892; W. (70, 94). Lat. 54° 52′ 11″; Long. 4° 26′ 40″. In a field about 200 yards N.N.E. of the Martyr's Monument.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 54	h. m. 10 51	° ′ 20 26·0	° ′ 20 37·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 28	69 57·2	69 59·4
2	12 44	69 57·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 50	1·6671	1·6638
V	11 21		

DESCRIPTIONS OF ENGLISH STATIONS.

245. **Abergavenny.** August 13, 1890; B. (61, 83). Lat. 51° 49′ 13″; Long. 3° 0′ 38″. 120 yards N.E. by E. of the Swan Hotel, and 120 yards S.E. by E. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 7	13 55	18 52·3	18 50·3
+5 57	17 20	18 53·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 38	67 58·2	67 56·8
2	16 32	67 56·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 54		1·7930
V	14 15	1·7935	
V	17 5	1·7909	

246. Abergwynolwyn. April 28, 1891; G. (60, 74). Lat. 52° 38′ 45″; Long. 3° 58′ 45″. In a field close to the village; 200 yards from the School which bore 10° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 13	11 24	19 27·6	19 29·6
+1 26	13 58	19 26·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 38	68 25·8	68 27·1
2	13 3	68 27·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 3		1·7598
V	11 35	1·7602	
V	14 9	1·7608	

247. Aberystwith. See "1890 Memoir," p. 133.

248. Abingdon. August 5, 1890; B. (61, 83). Lat. 51° 39′ 58″; Long. 1° 16′ 47″. In a field on the Oxfordshire bank of the Isis, and about 70 yards from a bridge over the river. St. Helen's Church bore 70° W. of N., and the Nag's Head Hotel 10° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 41	10 59	17 52·6	17 51·4
+2 2	14 37	17 55·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 3	67 50·8	67 49·6
2	13 50	67 49·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 1		
V	14 51	1·8020	1·8028

249. Alcester. August 25, 1892; R. (73, 99). Lat. 52° 12′ 39″. Long. 1° 51′ 54″; In a field to the S. of the town. A church, about $\frac{1}{3}$ mile distant, bore N. by W., the bridge E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 2	13 35	17 55·8	18 6·8
+3 38	15 36	17 56·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 1	68 4·0	68 5·9
2	15 20	68 3·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 50	1·7786	1·7753
D	14 23		

250. Aldeburgh. June 16, 1890; G. (60, 74). Lat. 52° 9′ 37″; Long. 1° 36′ 18″ E. In the North Field, about 50 yards from the gate by North Lodge, and about 200 yards from the beach. The Parish Church bore S.W., and a windmill N. by E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 4	11 16	16 48·1	16 44·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 51	67 40·0	67 39·0
2	13 18	67 39·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 0	1·8042	1·8052
V	11 33		

251. Alderney. See "1890 Memoir," p. 133.

252. **Alfreton.** August 23, 1892; G. (60, 74). Lat. 53° 5′ 58″; Long. 1° 23′ 22″. In the meadow N. of the church, the tower of which bore 25° W. of S., about 250 yards distant. Belfry on the school-house 37° E. of S., 200 yards distant. 120 yards E. of the road to Chesterfield.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 42	h. m. 10 38	° ′ 18 7·8	° ′ 18 18·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1 83 1	h. m. 11 39 11 51	° ′ 63 39·1 68 39·1	° ′ 63 41·1

Horizontal Force.

G.M.T.		H.	H_0.
D V	h. m. 11 11 10 52	1·7482	1·7450

253. **Alnwick.** See "1890 Memoir," p. 134.

254. **Alresford.** See "1890 Memoir," p. 135.

255*a*. **Alston.** May 15, 1891; W. (70, 94). Lat. 54° 48′ 40″; Long. 2° 26′ 30″. In a field near the river; just N. of the bridge, and due W. of the Golden Lion Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 24	h. m. 11 24 11 35	° ′ 19 19·9 19 19·0	° ′ 19 22·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	15 23	69 35·3	69 35·8
2	16 0	69 34·5	
1	16 37	69 36·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 17	1·6814	1·6807

255*b*. ALSTON. May 16, 1891; W. (70, 94). Lat. 54° 48′ 38″; Long. 2° 26′ 30″. In the field on the N. side of the bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 31	15 15	19 20·8	19 23·5
+4 13			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 45	69 37·0	69 37·5
2	14 17	69 36·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 58		1·6839
V	12 10	1·6840	
V	15 26	1·6852	

256. **Ambleside.** August 19, 1890; R. and T. (70, 94). Lat. 54° 25′ 18″; Long. 2° 57′ 38″. In a field 100 yards N. of the Water Head Hotel, and close to the road by the Lake.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 11	h. m. 15 45	° ′ 19 42·8	° ′ 19 40·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1	h. m. 14 7	° ′ 69 38·8	° ′ 69 38·0
2	14 43	69 38·2	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 14 45	1·6822	1·6825
V	15 22	1·6813	

257. **Amlwch.** May 5, 1891; G. (60, 74). Lat. 53° 24′ 50″; Long. 4° 21′ 4″. On a small piece of common land between Amlwch and Trwyn-melyn, about 300 yards from the water's edge. A windmill near Amlwch bore 7° N. of E. and was about ¾ mile distant. East Mouse Island bore N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 3	h. m. 11 37	° ′ 19 57·7	° ′ 19 59·1
+1 46	14 18	19 55·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 52	69 16·7	69 17·4
2	13 11	69 17·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 14		
V	11 49	1·7047	1·7029
V	14 29	1·7025	

258. APPLEBY. See "1890 Memoir," p. 135.

259. APPLEDORE. July 11, 1890; B. (61, 83). Lat. 51° 1′ 52″; Long. 0° 47′ 32″ E. At the N.E. corner of the field at the back of the Post Office, and about 70 yards W. of the Canal. The Church bore due S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 27	10 35	16 48·7	16 45·3
	14 52	16 47·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 17	67 0·2	66 58·9
2	13 57	66 59·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 38		
V	10 58	1·8509	1·8518

260. ARMATHWAITE. August 4, 1892; G. (60, 74). Lat. 54° 48′ 10″; Long. 2° 46′ 25″. In the grounds of the Castle, about half a mile S.W. of the village, and 20 yards E. of the road to Salkeld, &c.; 200 yards N. of a cottage, and close to the point where a track leading down to it turns out of the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 39	16 2	19 22·4	19 33·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 28	69 38·6	69 40·5
83 1	16 36	69 38·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 11	1·6878	1·6846

261. ASHBOURNE. August 8, 1890; R. and T. (70, 94). Lat. 53° 0′ 53″; Long. 1° 44′ 5″. In the Croft, and about 60 yards W. of the bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+6 15	17 59	18 22·8	18 19·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 28	68 31·8	68 30·8
2	17 56	68 30·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	18 15	1·7517	1·7525

262. ATHERSTONE. August 6, 1890; R. and T. (70, 94). Lat. 52° 34′ 54″; Long. 1° 32′ 37″. In a field 400 yards E. of the Hall, and 60 yards distant from the high road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 39	16 10	19 2·6	18 59·7
	16 35	19 2·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 54	68 24·0	68 23·0
2	16 22	68 23·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 59	1·7612	1·7620
V	16 26		

263. AXBRIDGE. August 30, 1890; G. (60, 74). Lat. 51° 16′ 46″; Long. 2° 48′ 52″. In a field S. of the town, W. of a private road. The church bore 6° E. of N., about $\frac{3}{4}$ mile distant.

Declination.

.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 30	11 8	18 39·7	18 38·7
+1 27	14 5	18 42·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 43	67 38·0	67 36·6
2	13 6	67 36·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 4		1·8175
V	11 26	1·8180	
V	14 19	1·8155	

264 **Aysgarth.** July 23, 1889; R. and R. (60, 74). Lat. 54° 17′ 21″; Long. 1° 58′ 58″. In a field S. of the main road to Wensley. Almost due S. of the bridge over the Ure.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 0	17 21	19 16·7	19 6·7
+5 49	18 8	19 16·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 19	69 31·7	69 29·5
2	17 55	69 30·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 50	1·6856	1·6885

265. Bakewell. August 22, 1892 ; G. (60, 74). Lat. 53° 12′ 46″ ; Long. 1° 40′ 4″. In a narrow field between the river and a bye-road leading to Rowsley, about 250 yards S.E. of the bridge. Longmeadow House bore N. by E., about 200 yards distant. Spire of parish church due W., about $\frac{1}{3}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h m.	h. m.	° ′	° ′
−1 38	10 49	17 58·6	18 9·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 44	68 37·5	68 39·2
83 1	11 54	68 37·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 19	1·7545	1·7512
V	11 0		

266. Bala. April 25, 1891 ; G. (60, 74). Lat. 52° 52′ 15″ ; Long. 3° 39′ 22″. In a field on the E. side of the road to Llanwchllyn, near the S. end of the lake, and about $\frac{1}{4}$ mile S.W. of Glan-y-Llyn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 54	14 21	19 49·7	19 52·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 28	68 37·9	68 38·8
2	12 50	68 38·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 20		
V	11 55	1·7503	1·7496

267. **Barmouth** (1). April 27, 1891; G. (60, 74). Lat. 52° 45′ 0″; Long. 3° 58′ 30″. In a field on the Bryntirion estate, between the road and the river. About ½ mile E. of the half-way house between Barmouth and Dolgelley. About 120 yards from a small stone house which bore 20° S. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 52	11 37	18 38·3	18 40·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 44	68 24·7	68 25·3
2	12 58	68 24·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 13		
V	11 48	1·7759	1·7752

268. **Barmouth** (2). April 27, 1891; G. (60, 74). Lat. 52° 43′ 35″; Long. 4° 2′ 12″. On a small patch of grass between the road and the water, and on the N. side of the estuary. About 1 mile from Barmouth, 200 yards from a small cottage which bore 20° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 34	15 8	19 29·5	19 31·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 56	68 30·0	68 30·0
2	16 11	68 29·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 19	1·7732	1·7725

269. **Barnard Castle.** July 19, 1889; R. & R. (60, 74); Lat. 54° 32′ 32″; Long. 1° 55′ 29″. On an open piece of ground between the main street and the river. A little to the S. of the Bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 57	18 28	19 9·4	18 59·4
	18 58	19 9·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 37	69 37·2	69 36·5
2	19 11	69 39·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	18 48	1·6767	1·6796

270. **Barnsley** (Silkstone). October 2, 1890; G. (60, 74); Lat. 53° 31′ 53″; Long. 1° 33′ 40″. In a field E. of the road to Penistone, about ¼ mile past Silkstone Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 56	11 24	18 41·1	18 40·0
+1 51	14 14	18 42·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 42	68 56·1	68 54·8
2	12 59	68 54·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 7		1·7298
V	11 39	1·7307	
V	14 26	1·7278	

271. **Barrow.** See "1890 Memoir," p. 136.

272. Barton Hill. August 2, 1889; R. (60, 74). Lat. 54° 4′ 22″; Long. 0° 54′ 50″. In a field on the S. side of the York Road, about 100 yards N. of the Spittle Beck.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 57	13 13	18 49·5	18 40·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 37	69 13·4	69 11·8

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 27	1·7049	1·7076

273. Barton-on-Humber. May 8, 1891; W. (70, 94). Lat. 53° 40′ 25″; Long. 0° 31′ 35″. In a field near the road from South Ferriby to Winteringham, just beyond Ferriby Sluice. Windmill bearing N.N.W., about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 12	11 42	18 22·3	18 24·5
+3 52	16 24	18 22·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 30	68 56·1	68 56·5
2	15 9	68 55·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 37		1·7289
V	12 4	1·7297	
V	16 37	1·7292	

274. **Basingstoke.** September 11, 1890; G. (60, 74). Lat. 51° 13′ 59″; Long. 1° 3′ 53″. In Hackwood Park, about 2 miles S. of the town, and near a Lodge on the Alton Road. Hackwood House bore 40° W. of N., about 1 mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 12	11 20	17 36·5	17 35·4
+2 1	14 25	17 38·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 46	67 18·9	67 17·3
2	13 5	67 16·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 4		1·8383
V	11 35	1·8386	
V	14 36	1·8369	

275. **Beaumaris.** October 1, 1890; B. (61, 83). Lat. 53° 14′ 48″; Long. 4° 5′ 14″. On The Green, N. of the town, 50 yards from the wall by the beach. The Castle Flagstaff bore N.W., and the Pier Head 30° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 30	h. m. 11 6	° ′ 20 11·3	° ′ 20 9·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 38	69 12·4	69 10·8
2	14 20	69 10·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 13	1·7169	1·7174
V	11 37		

276. **Beccles.** September 10, 1892; G. (60, 74). Lat. 52° 27′ 23″; Long. 1° 33′ 32″ E. On the right bank of the river, about 300 yards above the church, the tower of which bore 10° N. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 46	h. m. 13 29	° ′ 16 39·6	° ′ 16 49·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 9	67 52·7	67 54·3
83 1	14 20	67 51·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 49	1·7887	1·7857

277. **Bedford.** See "1890 Memoir," p. 136.

278. **Bellingham.** May 19, 1892; G. (60, 74). Lat. 55° 8′ 40″; Long. 2° 15′ 25″. In a field behind the "Railway Hotel." A bridge over the Railway bore N.E., and the weather-cock on the Town-hall 30° E. of S., both about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 17	10 2	19 10·4	19 20·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	10 41	69 48·4	69 49·5
1	11 7	69 47·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 37		
V	10 13	1·6730	1·6702

279. **Bettws-y-Coed.** May 2, 1891 ; G. (60, 74). Lat. 53° 6′ 22″ ; Long. 3° 47′ 30″. In a field on Cwm-lanerch Farm, about $1\frac{1}{2}$ miles N. of the town. About 250 yards E. of the Railway and 20 yards W. of the river. The entrance to the farm-yard bore 5° S. of W. and was 120 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 16	11 17	20 7·1	20 9·0
+1 30	14 2	20 6·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 31	69 2·2	69 3·9
2	12 53	69 4·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 54		1·7231
V	11 29	1·7240	
V	14 13	1·7236	

280. **Beverley.** August 6, 1889 ; R. (60, 74). Lat. 53° 50′ 30″ ; Long. 0° 27′ 19″. On the Race-course.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 26	15 4	18 41·7	18 32·5

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	16 12	69 0·5	68 58·7
2	16 56	69 0·0	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
V	15 25	1·7190	1·7216

281. **Bewdley** (East). September 18, 1890; B. (61, 83). Lat. 52° 22′ 19″; Long. 2° 18′ 33″. In a field on the right bank of the River Severn, below Winterdine House, 80 yards from the river bank. The Railway Station bore N.E.

Declination.

Σ.	G.M.T.	δ.	δ₀.
h. m.	h. m.	° ′	° ′
−1 20	11 15	18 44·3	18 42·4

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	12 21	68 14·4	68 13·2
2	12 44	68 12·9	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
V	11 30	1·7711	1·7717

282. **Bewdley** (West). September 18, 1890; B. (61, 83). Lat. 52° 22′ 15″; Long. 2° 19′ 10″. In a field in Park Lane, about 200 yards beyond the hill. A public foot-path crosses the field in a S.E. direction 200 yards W. of the great fault.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 42	14 12	18 46·4	18 44·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 16	68 14·7	68 13·8
2	15 44	68 13 7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 32	1·7715	1·7722
V	16 8	1·7718	

283. **Bideford.** August 21, 1890; G. (60, 74). Lat. 51° 0′ 39″; Long. 4° 13′ 15″. In a field N. of the Clovelly Road, about 300 yards past the turning to Littleham, &c., 100 yards from the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 23	11 22	19 18·1	19 16·6
+2 51	15 23	19 19·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 14	67 42·2	67 41·1
2	13 37	67 41·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 6		1·8091
V	11 38	1·8087	
V	15 34	1·8080	

284. **Bingham.** October 8, 1890 ; G. (60, 74). Lat. 52° 57′ 35″ ; Long. 0° 57′ 30″. In a field, 100 yards W. of the road running N. from the village, about ½ mile from the point where it crosses the railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 14	11 6	18 5·5	18 4·9
+2 4	14 32	18 7·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 27	68 33·2	68 32·3
2	12 46	68 31·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 48		1·7559
V	11 20	1·7560	
V	14 41	1·7548	

285. **Birkenhead.** See "1890 Memoir," p. 137.

286. **Birmingham.** See "1890 Memoir," p. 138.

287. **Bishop Auckland.** August 6, 1892; G. (60, 74). Lat. 54° 39′ 48″; Long. 1° 39′ 53″. In a field on the Bishop of Durham's property, outside the Park wall, about $\frac{1}{4}$ mile E. of the main street of the town, 30 yards E. of the road known as "Durham Chase," and about 100 yards E.S.E. of the point where a public foot-path, skirting the Park wall, turns out of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 47	10 39	18 41·1	18 52·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 39	69 36·4	69 38·5
83 1	11 49	69 37·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 12	1·6781	1·6749
V	10 49		

288. **Bishop's Castle.** September 9, 1892; W. (70, 94). Lat. 52° 29′ 37″; Long. 2° 59′ 33″. Near the centre of a field 300 yards N. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 32	10 50	18 55·8	19 7·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 30	68 27·6	68 30·0
2	11 42	68 27·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 9	1·7593	1·7557

289. **Bitterley** (Ludlow). September 22, 1890; B. (61, 83). Lat 52° 23′ 26″; Long. 2° 38′ 7″. In the grounds of Bitterley Court, about 1 mile from the Giant's Chair; 200 yards W.S.W. of the lych gate of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 5	11 32	19 2·7	19 0·8
+2 6	15 0	19 2·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 39	68 17·9	68 16·6
2	14 36	68 16·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27		1·7706
V	11 55	1·7694	
V	15 16	1·7709	

290. **Blakeney.** May 6, 1892; W. (70, 94). Lat. 51° 45′ 40″; Long. 2° 27′ 5″. To the N.W. of Awre Junction Station. About 200 yards E. of Little Bon Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 56	h. m. 15 31	° ′ 18 17·3	° ′ 18 26·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 41	67 55·7	67 57·4
2	16 30	67 55·6	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 15 40	1·7935	1·7907

291. **Blandford.** July 12, 1890; G. (60, 74). Lat. 50° 51′ 15″; Long. 2° 10′ 9″. In a meadow on Lord Portman's estate, between the Crown Hotel and the river; about 120 yards N. of the latter. The hotel bore N.E., about 350 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 48	h. m. 10 53	° ′ 18 11·3	° ′ 18 8·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 31	67 12·9	67 12·3
2	12 55	67 13·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 39		
V	11 5	1·8372	1·8381

292. **Bootle.** Aug. 13, 1892; W. (70, 94). Lat. 54° 17′ 22″; Long. 3° 23′ 47″. At the S.W. corner of the field which lies to the S. of the road leading W. from the station, and to the W. of the road leading along the W. side of the railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 45	13 17	19 32·2	19 43·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 45	69 32·9	69 35·1
2	13 29	69 33·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 35		
V	14 10	1·6902	1·6870

293. **Boroughbridge.** July 16, 1889 ; R. and R. (60, 74). Lat. 54° 3′ 58″ ; Long. 1° 24′ 33″. In a field on the E. side of the Knaresborough Road, about 1 mile S. of Minskip, $\frac{1}{4}$ mile S. of the junction with the Arkendale Road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 21	17 47	18 57·2	18 47·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 5	69 19·9	69 18·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 21	1·7040	1·7067

294. **Boston.** August 24, 1889 ; R. (64, 74). Lat. 52° 58′ 37″ ; Long. 0° 1′ 7″. In the field behind the Peacock Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 42	14 58	18 7·1	17 58·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 30	68 20·7	68 19·1
2	16 46	68 20·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 51	1·7668	1·7696
V	15 23	1·7674	

295. Boulmer (1). May 25, 1891 ; W. (70, 94). Lat. 55° 25′ 18″ ; Long. 1° 35′ 0″.
24 yards N. of Station III.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 57	69 56·1	69 56·8
2	12 34	69 56·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 23	1·6615	1·6608

296. Boulmer (2). May 26, 1891 ; W. (70, 94). Lat. 55° 25′ 15″ ; Long. 1° 35′ 0″. About halfway up the field on the W. side of the village, near the S. hedge. About 90 yards S. of the basalt dyke.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 12	18 57·0	18 59·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 21	70 0·2	70 0·5
2	12 55	69 59·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 25	1·6588	1·6581

297. Boulmer (3). May 27, 1891; W. (70, 94). Lat. 55° 25′ 18″; Long. 1° 35′ 0″. About 30 yards from the N. hedge of the field, and 70 yards N. of the dyke. (Due N. of Station II.)

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 11	11 23	18 56·0	18 58·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 39	69 57·2	69 57·9
2	15 3	69 57·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 20		
V	11 44	1·6626	1·6619

298. **Boulmer** (4). May 27, 1891; W. (70, 94). Lat. 55° 25′ 17″; Long. 1° 35′ 0″. Over the dyke, in a line with Stations II. and III.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 4	h. m. 13 35	° ′ 18 55·8	° ′ 18 58·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 20	69 57·3	69 58·0
2	15 56	69 57·7	

Horizontal Force.

G.M.T.		H.	H_0.
V.	h. m. 13 53	1·6602	1·6595

299. **Bourne.** September 1, 1892; G. (60, 74). Lat. 52° 46′ 10″; Long. 0° 22′ 30″. In a field E. of a bye-lane running parallel to the main street of the town, and E. of it. The church tower bore due S., about $\frac{1}{3}$ mile distant, and a brewery 30° E. of S., about 250 yards distant. Twenty yards N. of some lawn-tennis courts.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 42	h. m. 10 29	° ′ 17 32·0	° ′ 17 42·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 3	68 13·3	68 15·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 38	1·7713	1·7681

300. Bourton-on-the-Water. August 6, 1890; B. (61, 83). Lat. 51° 52′ 32″; Long. 1° 44′ 55″. In the cricket field, to the S.E. of the village, 100 yards N.W. by W. of the pavilion.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 35	11 18	17 51·1	17 49·0
+3 31	15 26	17 52·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 54	68 1·8	68 1·5
2	14 30	68 2·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 43		
V	11 56	1·7843	1·7845
V	15 9	1·7831	

301. **Bovey Tracey.** July 24, 1890; G. (60, 74). Lat. 50° 35′ 33″; Long. 3° 41′ 12″. In a meadow adjoining the Railway; the Station bore 13° S. of E., $\frac{1}{3}$ mile distant. Lodge 120 yards S.S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 20	14 11	18 37·4	18 34·0
+2 53	15 37	18 36·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 25	67 7·3	67 6·7
2	12 48	67 7·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 53		
V	14 22	1·8484	1·8498
V	15 49	1·8193	

302. **Braintree**, see "1890 Memoir," p. 138.

303. **Brecon**, see "1890 Memoir," p. 139.

304 and 305. **Brent Tor.** August 13, 1890; G. (60, 74). 304. Lat. 50° 36′ 5″; Long. 4° 9′ 55″. 305. Lat. 50° 36′ 5″; Long. 4° 9′ 10″. *First Station.*—West of Brent Tor; the Church on the top of the hill bore 7° S. of E., about 300 yards distant. *Second Station.*—East of the hill; the Church bore due W., rather less than $\frac{1}{2}$ mile distant.

Declination.

	Σ.	G.M.T.	δ	δ_0.
	h. m.	h. m.	° ′	° ′
304	−1 58	10 43	19 10·0	19 7·4
305	+2 28	15 15	19 3·2	19 0·6

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
304	1	11 59	67 12·7	67 12·4
	2	12 29	67 13·6	

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
304	V	11 20	1·8474	1·8482
305	V	15 28	1·8382	1·8390

306. Bridgend. August 19 and 20, 1890; B. (61, 83). Lat. 51° 29′ 46″; Long. 3° 34′ 2″. In the S.W. corner of a large field belonging to Bryn-teg Farm. The farm-house was 100 yards distant and bore W.N.W.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Aug. 19	+6 6	10 50	18 58·6	18 55·8
		14 55	18 59·0	
,, 20	−3 50	8 55	18 57·4	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 19	1	13 15	67 48·9	67 47·4
	2	13 57	67 47·2	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 19	D	11 51		
,, 19	V	11 11	1·8028	
	V	15 33	1·8030	1·8039
,, 20	V	9 14	1·8038	

307. **Brigg.** August 17, 1889; R. (60, 74). Lat. 53° 33′ 13″; Long. 0° 29′ 1″. In a garden in front of a farm-house about half a mile north of the town on the road which leads to Elsham Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 28	9 56	18 25·3	18 18·0
+0 41	12 30	18 28·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 42	68 54·4	68 51·8
2	12 13	68 52·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 5	1·7313	1·7341
V	10 21	1·7317	

308. **Brightlingsea.** June 14, 1890; G. (60, 74). Lat. 51° 48′ 53″; Long. 1° 1′ 43″ E. In a field opposite the Victoria Inn; W. of Spring Road, and at the side of the field furthest from the road. Spire of Church (next to the Post Office) bore S. by E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 16	15 34	17 0·6	16 57·2
+3 52			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 54	67 31·7	67 30·9
2	12 28	67 31·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 36		
V	13 0	1·8133	1·8143

309. Bromsgrove. September 15, 1890; B. (61, 83). Lat. 52° 19′ 37″; Long. 2° 3′ 5″. In a large field, called Shaw Meadow, half way between the town and the Railway Station, 100 yards W. of the road and 100 yards S. of a brook. The Church bore 60° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 19	12 30	18 10·3	18 8·3
+3 41	15 22	18 10·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 53	68 12·4	68 11·1
2	14 30	68 10·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 11	1·7765	1·7775
V	3 4	1·7773	

310. **Bromyard.** September 16, 1890; B. (61, 83.) Lat. 52° 12′ 8″; Long. 2° 28′ 50″. On the racecourse on Bromyard Downs. The "Jubilee" oak-tree bore 40° W. of N. and the targets S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 21	18 44·5	18 43·9
+3 33	15 18	18 47·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 50	68 11·8	68 10·8
2	14 28	68 10·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 31	1·7737	1·7743
V	11 41		

311*a* and *b*. **Bude Haven.** See "1890 Memoir," p. 140.

312. **Buildwas.** September 5 and 8, 1890; B. (61, 83). Lat. 52° 38′ 13″; Long. 2° 31′ 0″. In a field on the left bank of the Severn, and half-way between Marnwood House and Buildwas Bridge, 60 yards from the river bank and 60 yards from the main road.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 5	+2 18	13 31	18 59·7	18 57·7
" 8	+1 2	12 49	19 0·2	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 5	1	15 35	68 25·4	68 24·5
	2	16 21	68 24·6	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 5	D	17 56		1·7609
,, 5	V	14 4	1·7608	
,, 5	V	16 57	1·7595	

313. Builth. April 20, 1891; G. (60, 74). Lat. 52° 9′ 34″; Long. 3° 24′ 40″. At the upper end of a field between the Rhayader Road and a bye-road which passes the entrance to the Hall. About 1 mile from Builth. The chapel spire adjacent to Builth Church bears 18° E. of S.

Declination.

Σ.	G.M.T.	δ	δ_0.
h. m.	h. m.	° ′	° ′
−1 12	11 18	19 15·1	19 17·3
	14 11	19 15·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 37	68 19·3	68 19·1
2	13 1	68 18·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 2		1·7682
V	11 33	1·7682	
V	14 2	1·7693	

314. **Burnley.** September 23, 1891; W. (70, 94). Lat. 53° 46′ 3″; Long. 2° 15′ 28″. In a field to the E. of the Manchester Road, and S. of the point at which the road to Crown Point leaves it.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 41	13 5	18 44·5	18 49 7
+1 44	14 8	18 44·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 26	69 12·2	69 13·5
2	11 52	69 12·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 28		
V	13 16	1·7124	
D	14 59		1·7106
V	14 25	1·7116	

315. **Burrough-on-the-Hill.** October 10, 1890; G. (60, 74). Lat. 52° 41′ 25″; Long. 0° 52′ 28″. In a field on the S. side of the road from Summerby to Burrough; about $\frac{1}{4}$ mile E.N.E. of Burrough Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 17	14 26	18 20·5	18 19·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 9	68 15·3	68 13·7
2	13 25	68 12·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 29	1·7755	1·7759
V	11 58		

316. Burton-on-Trent. August 8, 1890; R. and T. (70, 94). Lat. 52° 48′ 53″; Long. 1° 38′ 53″. In a field near Outwood, and to the W. of the Canal. The Workhouse was 500 yards distant and bore N.W. by W. Hormington Church bore N. by E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 33	11 12	18 28·8	18 25·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 43	68 28·3	68 27·6
2	11 4	68 28·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 59	1·7577	1·7585
V	11 28		

317. **Bury St. Edmunds.** June 17, 1890; G. (60, 74). Lat. 52° 13′ 35″; Long. 0° 42′ 43″ E. At Hardwicke Heath (about $1\frac{1}{2}$ miles S. of the town). In a meadow in front of the House, the entrance of which bore S.E. by S., about 400 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 24	14 53	17 13·3	17 10·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 20	67 49·0	67 48·3
2	12 48	67 49·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 29		
V	14 5	1·7963	1·7973

318. **Butterwick-on-Trent.** August 16, 1889; R. (60, 74). Lat. 53° 32′ 23″; Long. 0° 44′ 4″. In a field behind the houses on the East bank of the Trent, nearly opposite to the Ferry.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 58	14 13	18 19·3	18 10·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 45	68 52·6	68 50·6
2	13 0	68 51·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 42	1·7363	1·7389

319. **Buxton.** August 11, 1890; R. and T. (70, 94). Lat. 53° 15′ 24″: Long. 1° 56′ 15″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 23 +0 12	12 1	18 40·0	18 37·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 2	11 17 12 6	68 45·6 68 45·4	68 44·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 16	1·7418	1·7426

320. **Caermarthen.** August 27, 1890; B. (61, 83). Lat. 51° 51′ 33″; Long. 4° 18′ 10″. In the field belonging to the Grammar School; 60 yards from the School, which bore 30° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 17 +2 7	11 35 15 35	19 36·0 19 37·5	19 34·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 1	68 18·9	68 17·8
2	15 3	68 17·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 47		
V	11 57	1·7692	1·7692
V	15 51	1·7677	

321. Caerphilly. May 13, 1892; W. (70, 94). Lat. 51° 34′ 3″; Long. 3° 13′ 6″. In a field, about 400 yards to the S. of the Railway Station. About 200 yards due S. of Pen-y-Capel Farm-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 49	13 22	18 43·7	18 53·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 28	67 50·8	67 53·1
2	10 49	67 51·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 34		
V	12 6	1·8012	1·7982

322. CAMBRIDGE. See "1890 Memoir," p. 141.

323*a*. CARDIFF. See "1890 Memoir," p. 141.

323*b*. CARDIFF. May 12, 1892; W. (70, 94). Lat. 51° 29′ 36″; Long. 3° 10′ 33″. The same station as that at which observations were made in the 1886 Survey.*

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −2 42	h. m. 9 49	° ′ 18 35·4	° ′ 18 45·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 11	67 44·6	67 46·1
2	11 26	67 44·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 34		
V	10 4	1·8095	1·8056

324. CARDIGAN. See "1890 Memoir," p. 142.

325. CARLISLE. See "1890 Memoir," p. 143.

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* A heavy iron railing had been placed 70 yards away in the interval between the two surveys.

326. **Carnarvon.** May 4, 1891; G. (60, 74). Lat. 53° 7′ 29″; Long. 4° 16′ 5″. In a field on the W. side of the Pwllheli Road, about 1¼ miles from Carnarvon and 200 yards N. of Cocksidier. The Eagle Tower of Carnarvon Castle bore 26° W. of N., and Llanbeblig Church Tower 16° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 27	14 3	19 44·4	19 46·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 28	69 8·2	69 7·4
2	15 47	69 5·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 51	1·7245	1·7238
V	14 17		

327. **Carno.** September 12, 1892; W. (70, 94). Lat. 52° 33′ 41″; Long. 3° 32′ 20″. In a field about 100 yards S.W. of the road from the station to the village; 100 yards S. of some cottages near the bridge over the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 10	14 31	19 12·6	19 24·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 12	68 34·7	68 37·2
2	13 31	68 35·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 31		
V	12 6	1·7529	1·7493

328. Castle Cary. September 2 and 3, 1890; G. (60, 74). Lat. 51° 5′ 19″; Long. 2° 30′ 5″. In a field about ½ mile from the village, S. of the Bruton Road, and just past the branch road to Week Champflower. Finger-post at the branch bore 60° W. of N., 100 yards distant.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 3	+3 52	16 16	18 22·0	18 19·9

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0
		h. m.	° ′	° ′
Sept. 2	1	12 50	67 25·5	67 25·2
,, 2	2	13 17	67 26·2	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 3	D	11 41		
,, 3	V	11 11	1·8262	1·8277
,, 2	V	16 21	1·8279	

329. **Castleton.** August 20, 1892; G. (60, 74). Lat. 53° 20′ 37″; Long. 1° 46′ 33″. In a field to the N.W. of the village; the church tower bore 35° E. of S., about 200 yards distant; 100 yards N. of the road to Chapel, and 20 yards from a small stream. About 350 yards from the Keep of the Castle, which bore due S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 51	9 39	18 22·3	18 33·2

Inclination.

Needle.	G.M.T.	.	θ_0.
	h. m.	° ′	° ′
1	10 39	68 46·4	68 48·7
83 1	10 51	68 47·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 11	1·7410	1·7377
V	9 51		

330. **Chelmsford.** September, 17, 1890; G. (60, 74). Lat. 51° 41′ 27″; Long. 0° 27′ 53″ E. On Galleywood Common, about 3 miles S. of the town. On the Western edge of the Common, between the racecourse and the hedge; the grand stand bore 15° W. of N., about ½ mile distant, and a white house 6° N. of E., 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 59	11 25	17 21·5	17 20·9
+2 10	14 27	17 23·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 46	67 34·5	67 33·9
2	13 7	67 34·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 9		1·8139
V	11 39	1·8137	
V	14 39	1·8131	

331*a*. CHEPSTOW. See "1890 Memoir," p. 231.

331*b*. CHEPSTOW. May 6, 1892; W. (70, 94). Lat. 51° 38′ 2″; Long. 2° 41′ 7″. In a field to the S.W. of the town, about 400 yards to the S.E. of St. Lawrence House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 33	10 59	18 31·1	18 39·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 17	67 49·0	67 50·6
2	12 34	67 48·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 43		
V	11 16	1·8036	1·8008

332. CHESTER. September 26 and 27, 1890; B. (61, 83). Lat. 53° 11′ 7″; Long. 2° 53′ 46″. On the racecourse, about 200 yards N. of Grosvenor Bridge. The stone in the middle bore 10° W. of N., the Castle E., and the tower of the Gasworks 50° W. of N.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 27 . . .	−2 5 −1 57	9 34	19 13·4	19 11·6

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 26 . . .	1 2	13 20 13 57	68 48·5 68 46·7	68 47·2

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 26 . . .	D	12 22		1·7383
,, ,, . . .	V	11 24	1·7380	
,, ,, . . .	V	11 49	1·7375	
,, ,, . . .	V	14 58	1·7378	

333. CHESTERFIELD. See "1890 Memoir," p. 143.

334. CHICHESTER. See "1890 Memoir," p. 144.

335. CHILCOMPTON. September 4, 1890; G. (60, 74). Lat. 51° 15′ 45″; Long. 2° 29′ 38″. In a field on the S. side of a bye-road between Chilcompton and Stratton-on-Fosse. The tower of Stratton Church bore 19° E. of S., about ½ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 50 +3 42	14 40 15 37	18 28·2 18 30·6	18 27·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 10	67 33·8	67 33·7
2	13 30	67 34·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		
V	11 55	1·8166	1·8176
V	14 55	1·8173	

336. CHIPPENHAM. September 6, 1890; G. (60, 74). Lat. 51° 26′ 55″; Long. 2° 5′ 55″. In a field (the second from the road) S.E. of the town, about $\frac{1}{4}$ mile S. of the main road from London. Belfry of a cemetery-chapel bore 35° E. of N., about $\frac{1}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 10	11 25	18 6·8	18 4·8
+2 2	14 36	18 7·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 58	67 38·5	67 38·0
2	13 16	67 38·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 9		
V	11 42	1·8128	1·8135
V	14 49	1·8130	

337. **Cirencester.** May 2, 1892; W. (70, 94). Lat. 51° 42′ 32″; Long. 1° 58′ 58″. In a field to the W. of the town. About 200 yards W. of the cemetery.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 41	11 34	17 58·1	18 6·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 7	67 52·8	67 54·5
2	10 33	67 52·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 46	1·7934	1 7907

338 **Clenchwarton.** See "1890 Memoir," p. 145.

339. **Clifton.** See "1890 Memoir," p. 145.

340. **Clovelly.** See "1890 Memoir," p. 146.

341. **Clun.** September 5, 1892; W. (70, 94). Lat. 52° 24′ 37″; Long. 3° 2′ 23″. In a field on the E. side of the road to Knighton, and just opposite the first mile stone.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 53	11 36	19 1·9	19 13·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 0	68 22·8	68 24·8
2	12 14	68 22·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 59	1·7673	1·7638
V	12 36		

342. **Coalport.** September 14, 1892; W. (70, 94). Lat. 52° 37′ 6″; Long. 2° 26′ 0″. In a field to the W. of the road from the bridge to Sutton Hill, and just N. of an unfenced road leading to some cottages about half-way between the bridge and Sutton House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 9	11 15	18 34·3	18 45·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 16	68 23·2	68 25·5
2	12 28	68 23·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 50	1·7616	1·7582
V	11 27		

343. **Coalville.** See "1890 Memoir," p. 147.

344. **Cockermouth.** September 8 and 9, 1891; W. (70, 94). Lat. 54° 40′ 16″; Long. 3° 20′ 53″. About 250 yards due S. of Park House.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 9 . . .	−1 18 +0 59	11 17 13 32	19 48·7 19 49·0	19 54·0

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 8 . . .	1 2	13 40 14 9	69 42·2 69 41·8	69 43·0

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 9 . . .	D	12 20		1·6809
„ 8 . . .	V	15 3	1·6817	
„ 9 . . .	V	11 33	1·6827	

345. **Colchester.** See "1890 Memoir," p. 147.

346. **Coleshill.** August 5, 1890; R. and T. (70, 94). Lat. 52° 29′ 53″; Long. 1° 42′ 32″. In a field which is bounded by two roads, and is 100 yards to the W. of the Swan Hotel. The Church bore E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	
+4 25	17 3	18 21·2	18 18·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 40	68 21·9	68 20·6
2	17 13	68 20·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 48	1·7649	1·7657
V	17 16		

347. CONGLETON. May 13, 1892; G. (60, 74). Lat. 53° 10′ 5″; Long. 2° 13′ 0″. In a field, N. of the town, about 200 yards from Dane Mill, which bore 52° W. of S. 15 yards S. of a bye-lane leading to the Bottom Mills.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 33	11 59	18 30·4	18 40·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 18	68 39·7	68 41·6
1	13 30	68 40·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 36	1·7455	1·7427
V	12 11		

348. **Coniston.** August 15, 1892; W. (70, 94). Lat. 54° 22′ 9″; Long. 3° 3′ 52″. 170 yards W.N.W. of the Waterhead Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 3	10 35	19 23·6	19 35·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 17	69 38·6	69 40·4
2	12 32	69 38·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 35	1·6855	1·6823
V	11 1		

349. **Corby** (Lincolnshire). September 5, 1892; G. (60, 74). Lat. 52° 48′ 35″; Long. 0° 31′ 40″. In a field W. of the village, and E. of a bye-road which turns E. out of the road between it and the Railway Station; 300 yards from the corner. A wind-mill near the Church bore 30° N. of E., about ¼ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 46	11 28	17 47·7	17 58·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 25	68 15 0	68 16·7
83 1	12 35	68 14·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 0		
V	11 39	1·7723	1·7691

350. CORFE CASTLE. July 10, 1890; G. (60, 74). Lat. 50° 38′ 14″; Long. 2° 3′ 35″. Near the centre of a field W. of the village, about 70 yards from a cottage, which bore N.N.E. The Castle Keep bore N.E., and the tower of the church E. by S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 0	10 40	18 0·4	17 57·6
+1 33	13 34	18 1·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 15	67 4·3	67 4·0
2	12 36	67 5·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 28		
V	10 54	1·8467	1·8472
V	13 21	1·8459	

351. CORLEY ASH. August 5, 1890; R. and T. (70, 94). Lat. 52° 28′ 20″; Long. 1° 33′ 52″. In a field opposite the entrance of the Saracen's Head Inn, and 70 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 54	11 38	18 7·4	18 4·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 23	68 18·1	68 17·7
2	11 48	68 18·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 50	1·7716	1·7724

352. CRAVEN ARMS. September 2, 1892; W. (70, 94). Lat. 52° 26′ 15″; Long. 2° 50′ 18″. 10 yards S. of the road which passes under the bridge at the S. end of the Railway Station, and 300 yards W. of this bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 8	15 30	18 56·5	19 8·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 40	68 18·4	68 20·7
2	15 54	68 19·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 14	1·7741	1·7707

353. Crickhowel. May 10, 1892; W. (70, 94). Lat. 51° 51′ 52″; Long. 3° 9′ 9″. To the W. of the village, about 250 yards S.W. of Tir Ash Farm-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 0	11 32	18 35·9	18 45·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 15	68 0·1	68 1·8
2	13 31	68 0·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27		
V	11 48	1·7932	1·7904

354. Cromer. See "1890 Memoir," p. 148.

355. Crosby (Isle of Man). August 20, 1892; W. (70, 94). Lat. 54° 11′ 7″; Long. 4° 34′ 24″. 100 yards W.S.W. of a farm-house, which lies on the S. side of the main road, and is about 400 yards N.W. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 40	13 20	19 48·3	19 59·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 22	69 44·9	69 47·1
2	12 37	69 45·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 8	1·6782	1·6748
V . .	13 36		

356. Crynant. May 14, 1892; W. (70, 94). Lat. 51° 43′ 47″; Long 3° 44′ 32″. About 350 yards E.N.E. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 4	13 40	19 6·4	19 15·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 39	68 0·5	68 2·5
2	12 54	68 0·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 31	1·7960	1·7931
V	14 0		

357. Cuckfield. June 26, 1890; B. (61, 83). Lat. 51° 0′ 10″; Long. 0° 8′ 20″. 200 yards E.S.E. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 57	15 8	17 47·9	17 45·2
	18 25	17 48·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 39	67 15·1	67 13·8
2	19 11	67 14·1	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	16 5		
V	15 28	1·8148	1·8455
V	18 41	1·8441	

358. Dartford. May 2, 1891; W. (70, 94). Lat. 51° 26′ 15″; Long. 0° 13′ 5″ E. In a meadow on the Orange-tree Farm; Church bearing N.N.E.; powder mills E.S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 34	11 53	17 12·3	17 14·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 28	67 20·5	67 21·0
2	14 0	67 20·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 4		1·8324
V	12 32	1·8328	
V	16 40	1·8331	

359. **Dartmouth.** July 25 and 26, 1890; G. (60, 74). Lat. 50° 21′ 8″; Long. 3° 35′ 20″. In a field N.E. of the town, nearly opposite Townstall Churchyard; the Church-tower bore 40° S. of W., about 250 yards distant.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 26	+1 15	13 27	18 45·0	18 42·2

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	h. m.	° ′
July 25	1	13 31	67 3·0	67 3·4
	2	13 57	67 5·5	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 25	D	12 42		
	V	12 14	1·8475	1·8484

360. **Daventry.** August 2, 1890; R. and T. (70, 94). Lat. 52° 15′ 13″; Long. 1° 9′ 46″. In a field to the S. of the Banbury Road, and 300 yards from the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 24	h. m. 15 1	° ′ 18 27·3	° ′ 18 24·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 39	68 3·8	68 4·2
2	14 56	68 5·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 5	1·7758	1·7766
V	15 43		

361. **Dawley (Salop).** September 8, 1890; B. (61, 83). Lat. 52° 39′ 44″; Long. 2° 28′ 13″. Near the centre of the cricket ground. The National Schools bore W.N.W., and the chimney stack of the Gas Works W.S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −3 52	h. m. 8 34	° ′ 18 52·2	° ′ 18 50·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	9 25	68 24·7	68 24·2

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	8 52	1·7602	1·7608

362. **Deal.** July 14, 1890; B. (61, 83). Lat. 51° 14′ 18″; Long. 1° 24′ 7″ E. On the sand-hills to the N. of the town; 60 yards E. of the road to Sandwich, and 100 yards W.S.W. of Sandown Castle.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 1			
+3 13	15 42	16 19·0	16 16·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 59	67 10·3	67 8·5
2	14 41	67 8·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 40		
V	11 56	1·8408	1·8412
V	16 4	1·8398	

363. DERBY. May 6, 1892; G. (60, 74). Lat. 52° 55′ 45″; Long. 1° 27′ 32″. In a field on the E. side of the race-course, and S. of the rifle ranges. The flagstaff on the Grand Stand Hotel bore due S. about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 26	11 9	17 51·0	17 59·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	12 20	68 27·5	68 29·8
1	12 34	68 28·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 53		
V	11 24	1·7580	1·7554

364. DEREHAM. September 22, 1890; G. (60, 74). Lat. 52° 41′ 25″; Long. 0° 56′ 35″ E. In a field W. of the Fakenham Road, about ½ mile from Dereham; 200 yards from the road. "Quebec" (the residence of General Bulwer) bore 35° N. of E., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 53	11 24	17 15·4	17 13·7
+2 17	14 21	17 15·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 46	68 8·2	68 7·4
2	13 6	68 7·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 9		
V	11 40	1·7803	1·7810
V	14 33	1·7806	

365. DESFORD. May 4, 1892; G. (60, 74). Lat. 52° 37′ 54″; Long. 1° 16′ 52″. In a field S. of the road between the Railway Station and the village, about 250 yards from the former. By the N.E. boundary of the field, 50 yards from the road, and 120 yards from the "Lancaster Arms" Inn, which bore 20° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 39	14 2	17 50·9	17 59·7

Inclination.

Needle.	G.M.T	θ.	θ_0.
	h. m.	° ′	° ′
1	13 34	68 17·7	68 19·2
2	13 22	68 17·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 38		
V	14 13	1·7665	1·7638

366. DEVYNOCK. May 16, 1892; W. (70, 94). Lat. 51° 57′ 1″; Long. 3° 34′ 20″. About 400 yards N.W. of the Railway Station, and 200 yards N.N.E. of the Church. About 40 yards N. of the foot-path leading to the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 14	h. m. 13 27	° ′ 19 4·8	° ′ 19 14·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 13	68 11·1	68 13·0
2	15 33	68 11·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 11		
V	13 43	1·7815	1·7786

367. DHOON GLEN (Isle of Man). August 19, 1892; W. (70, 94). Lat. 54° 15′ 9″; Long. 4° 22′ 30″. 50 yards W. of the main road, and about 400 yards N. of the Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 19	h. m. 15 59	° ′ 20 1·1	° ′ 20 12·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 45	69 41·7	69 43·8
2	17 2	69 42·0	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 16 12	1·6816	1·6782

368. Dinas Mawddy. September 2, 1890; B. (61, 83). Lat. 52° 43′ 22″; Long. 3° 42′ 20″. In the first field beyond the plantation on the S. side of the Dolgelly Road, and about 1 mile from the village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 51	h. m. 14 5 17 5	° ′ 19 37·2 19 36·3	° ′ 19 34·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1 2	h. m. 14 40 16 30	° ′ 68 35·1 68 33·2	° ′ 68 33·6

Horizontal Force.

G.M.T.		H.	H_0.
V V	h. m. 14 32 17 33	1·7525 1·7516	1·7528

369. Diss. September 9, 1892; G. (60, 74). Lat. 52° 22′ 28″; Long. 1° 6′ 27″ E. In the meadow on the W. side of the Mere; 50 yards E. of the porch of a chapel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 29	h. m. 10 36	° ′ 16 46·8	° ′ 16 57·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 29	67 49·6	67 51·7
83 1	11 39	67 49·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 6		
V	10 46	1·7998	1·7966

370. Dolygaer (Merthyr Tydvil). August 15, 1890; B. (61, 83). Lat. 51° 49′ 34″; Long. 3° 21′ 18″. About 100 yards from where a small brook crosses the cart-track which leads from the Railway Station, past a colliery. Under the brow marked Pen-y-gaer on the Ordnance map.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 3	12 3	19 7·8	19 5·5
	16 46	19 8·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 15	68 3·0	68 1·6
2	15 52	68 1·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 52		
V	12 47	1·7893	1·7883
V	17 5	1·7857	

371. DONCASTER. August 15, 1889 ; R. (60, 74). Lat. 53° 31′ 12″ ; Long. 1° 5′ 49″. On the race-course, about 500 yards E. of the grand stand.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 21	h. m. 12 12	° ′ 18 28·4	° ′ 18 19·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 2	68 55·9	68 52·8
2	11 23	68 53·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 59	1·7315	1·7342
V	12 31	1·7316	

372. DORRINGTON. September 2, 1892 ; W. (70, 94). Lat. 52° 37′ 30″ ; Long. 2° 46′ 0″. 200 yards N.E. of the Railway Station. On the stream about 10 yards N. of the bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 30	h. m. 10 55	° ′ 18 47·7	° ′ 18 59·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 8	68 32·2	68 34·5
2	12 23	68 32·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 38		
V	11 14	1·7522	1·7488

373. Dover. See "1890 Memoir," p. 148.

374. Downham Market. September 25, 1890; G. (60, 74). Lat. 52° 36′ 12″; Long. 0° 23′ 25″ E. In a field on the N. side of the road to Bexwell, about ¾ mile from the centre of the town; 200 yards from the road. The Church spire in Downham bore due W., about ¾ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	10 56	17 21·3	17 20·1
+2 17	14 27	17 22·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 26	68 5·8	68 4·7
2	12 46	68 4·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 43		
V	11 13	1·7855	1·7848
V	14 40	1·7831	

375. **Drewsteignton.** August 19, 1890; G. (60, 74). Lat. 50° 42′ 13″; Long. 3° 48′ 40″. In a field on the N. side of the road between Whiddon Down and Drewsteignton, about 1¼ miles from the latter.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 43	17 16	19 18·0	19 15·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 31	67 19·0	67 18·4
2	13 52	67 18·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 49		
V	12 19	1·8572	1·8579

376. **Dunchurch.** August 4, 1890; R. and T. (70, 94). Lat. 52° 20′ 22″; Long. 1° 17′ 10″. In a field to the E. of the Rugby Road, and 400 yards from the Church, which bore S. by E. Bilton Grange bore E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 49	11 47	18 36·7	18 34·0

Inclination.

Needle.	G.M.T.	θ_0.	θ_0.
	h. m.	° ′	° ′
1	11 36	68 8·1	68 7·9
2	12 25	68 9·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 42		
V	12 10	1·7805	1·7813

377. Durham. October 3 and 5, 1891; W. (70, 94). Lat. 54° 46′ 3″; Long 1° 34′ 58″. About 200 yards S.E. of the Observatory. The Cathedral bore 40° E. of N.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Oct. 5 . . .	−1 28	10 49	18 41·8	
	−0 56	11 30	18 39·1	18 45·4
	+0 39	12 13	18 38·7	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Oct. 3 . . .	1	12 33	69 37·0	69 38·4
	2	13 8	69 37·8	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Oct. 3 . . .	D	14 34		
	V	11 26	1·6837	
	V	14 0	1·6826	1·6815
	V	15 38	1·6825	

378. **Eastbourne.** June 28, 1890; B. (61, 83). Lat. 50° 45′ 50″; Long. 0° 15′ 52″ E. In a hollow at the centre of the Golf Links. The Town Hall bore E.N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 59	11 42	17 6·6	17 4·1
	16 27	17 7·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 18	66 51·0	66 50·0
2	15 45	66 50·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m		
D	12 50		
V	12 4	1·8582	1·8577
V	16 50	1·8552	

379. **East Grinstead.** June 25, 1890; B. (61, 83). Lat. 51° 7′ 0″; Long. 0° 0′ 20″. In a field belonging to Mr. Murchison; about 300 yards from Uplands House, which bore 10° W. of N. Grinstead Church bore 15° E. of N., and Brookhurst Farm-house 30° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 24	11 33	17 21·1	17 18·9
+4 8	15 31	17 22·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 10	67 6·6	67 7·2
2	14 52	67 9·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 46		1·8430
V	12 2	1·8417	
V	15 45	1·8423	

380. EGGESFORD. August 20, 1890 ; G. (60, 74). Lat. 50° 53′ 40″ ; Long. 3° 52′ 13″. In a field about 200 yards N. of the road to Chulmleigh, near two thick pine-woods. 300 yards from a ford over a stream, which bore 35° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 7	11 40	19 7·8	19 5·5
+1 57	14 45	19 8·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 6	67 33·7	67 32·2
2	13 27	67 31·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 26		1·8228
V	11 57	1·8223	
V	14 58	1·8218	

381. **Ely.** September 26, 1890; G. (60, 74). Lat. 52° 25′ 13″; Long. 0° 16′ 38″ E. In a field, 70 yards E. of the Littleport Road, and about 1½ miles from the city; the Cathedral Tower bore 20° W. of S. A public footpath ran by the S. side of the field.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 57			
+1 15	13 36	17 29·4	17 27·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 14	67 58·5	67 57·7
2	12 31	67 57·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 44	1·7858	1·7869
V	13 50	1·7869	

382. **Eskdale** (1). September 11, 1891; W. (70, 94). Lat. 54° 23′ 51″; Long. 3° 15′ 58″. Near Boot. About half-way up the field to the S.W. of Hollin's Farm, and close to the stream.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° °	° ′
−1 50	10 38	19 40·0	19 45·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 10	69 35·5	69 36·6
2	12 28	69 35·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 21		
V	10 50	1·6870	1·6857

383. **Eskdale** (2). September 11, 1891; W. (70, 94). Lat. 54° 23′ 51″; Long. 3° 15′ 22″. Near Boot. In the field to the W. of the road leading to Christcliff Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m	h. m.	° ′	° ′
+2 20	14 53	19 36·8	19 41·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 37	69 36·1	69 37·3
2	13 56	69 36·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 37		
V	15 5	1·6883	1·6870

384. **Etchingham.** July 9 and 10, 1890; B. (61, 83). Lat. 51° 0′ 23″; Long. 0° 26′ 9″ E. In a field behind the Rectory, which bore W.N.W.

Declination.

Date	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 10	−2 26	10 44	17 1·3	16 58·6
		12 32	17 1·7	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 9	1	12 19	67 0·3	66 59·1
	2	13 12	66 59·5	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 10	D	11 58		1·8474
„ 9	V	15 3	1·8461	
„ 9	V	15 23	1·8454	
„ 10	V	11 13	1·8481	

385. **Exhall.** August 24, 1892; R. (73, 99). Lat. 52° 27′ 55″; Long. 1° 28′ 45″. In a field on the E. side of a road which runs parallel and to the W. of the Railway. About 400 yards from the Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 32	15 58	18 37·1	18 48·5
+4 31	16 25	18 38·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 22	68 20·3	68 22·2
2	15 40	68 20·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 3		
V	16 10	1·7666	1·7633

386. FALMOUTH. See "1890 Memoir," p. 149.

387. FARINGDON. April 30, 1892 ; W. (70, 94). Lat. 51° 39′ 40″ ; Long. 1° 34′ 23″. In a field to the E. of the village. About 300 yards N.N.E. of the clump of trees called, on the Ordnance map, Faringdon Clump.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 44	10 45	17 38·8	17 47·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 10	67 52·4	67 54·7
2	12 26	67 53·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h m.		
D	11 37		
V	11 9	1·8017	1·7990

388. Fenny Compton. August 23, 1892; R. (73, 99). Lat. 52° 10′ 25″; Long. 1° 22′ 15″. In a field 250 yards E.N.E. of the shelter cabin on the down side of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 21 −1 3 −1 1	12 9	18 9·3	18 19·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 36	68 7·6	68 9·6
2	11 51	68 7·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 50		
V	12 22	1·7825	1·7792

389. Ferryside (Broadley), Carmarthen. August 28, 1890; B. (61, 83). Lat. 51° 45′ 21″; Long. 4° 21′ 35″. 200 yards S. of Broadley House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 36	11 47	19 17·8	19 14·6
+3 46	16 21	19 16·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 42	68 22·4	68 21·6
2	15 9	68 22·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 47	1·7744	1·7751
V	12 8		

390. **Fleetwood.** September 16 and 18, 1891 ; W. (70, 94). Lat. 53° 55′ 10″; Long. 3° 1′ 51″. About 200 yards due E. of the powder magazine.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 18	−1 4	11 25	19 15·5	19 20·8
„ 18	+1 8	12 59	19 15·2	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 16	1	13 20	69 16·9	69 17·9
	2	13 46	69 16·9	
„ 18	1	12 18	69 15·9	69 17·4
	2	12 40	69 17·0	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 16	D	12 26		1·7067
	V	11 41	1·7080	
	V	11 57	1·7078	
	V	15 55	1·7085	

391. **Foggathorpe.** August 9, 1889 ; R. (74). Lat. 53° 49′ 44″; Long. 0° 51′ 7″. In a field close to the cross-roads, and S.E. of their junction.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 26	69 9·4	69 7·1
2	12 42	69 8·1	

392. **Ford Junction.** July 2, 1890 ; G. (60, 74). Lat. 50° 49′ 30″ ; Long. 0° 34′ 33″. In a meadow S. of the "Ship and Anchor" Inn, about 400 yards from the Railway Station, which bore N.W. by N. 200 yards N.E. of some disused waterworks.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 36	14 7	17 33·4	17 30·8
	15 53	17 34·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 0	67 0·8	67 0·2
2	14 27	67 1·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 19	1·8503	1·8512
V	16 6	1·8503	

393. **Forncett.** September 20, 1890; G. (60, 74). Lat. 52° 29′ 43″; Long. 1° 12′ 48″ E. In a field on the S. side of the road to Long Stratton, about $\frac{3}{4}$ mile E. of Forncett Station; 200 yards from the road, and 15 yards N. of a round pond.

Declination.

Σ.	G.M.T.	δ.	δ₀.
h. m.	h. m.	° ′	° ′
−2 9	10 43	17 1·8	17 1·4
+1 41	13 55	17 4·6	

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	12 28	67 56·7	67 55·9
2	12 49	67 56·0	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
D	11 44		
V	10 59	1·7883	1·7901
V	14 6	1·7909	

394. **Freshwater.** July 4, 1890; G. (60, 74). Lat. 50° 40′ 0″; Long. 1° 32′ 23″. Near the top of High Down, on the landward slope, and about 100 yards S. of the Beacon.

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	13 28	67 4·1	67 3·9
2	14 0	67 5·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 55		
V	11 26	1·8440	1·8449

395. Gainsborough. See "1890 Memoir," p. 150.

396. Gainsborough. August 26, 1892; G. (60, 74). Lat. 53° 22′ 45″; Long. 0° 45′ 45″. About a mile from Gainsborough, in a field on the W. side of the Lea Road; about 300 yards S. of a railway bridge over the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 31	10 43	17 53·4	18 3·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 38	68 39·9	68 41·9
83 1	11 49	68 40·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 14		
V	10 53	1·7456	1·7426

397. GARSTANG. September 14, 1891; W. (70, 94). Lat. 53° 53′ 45″; Long. 2° 46′ 38″. About 150 yards W. of the aqueduct by which the canal crosses the River Wyre.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 34	16 7	19 11·3	19 17·2
+4 26	16 54	19 13·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 48	69 14·0	69 15·1
2	18 10	69 14·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h m.		
V	16 21	1·7105	1·7087
V	17 6	1·7094	

398. GIGGLESWICK. See "1890 Memoir," p. 150.

399. GLOUCESTER. See "1890 Memoir," p. 151.

400. GOODRICH. See "1890 Memoir," p. 231.

401. GOSPEL OAK. August 6, 1890; R. and T. (70, 94). Lat. 52° 32′ 29″; Long. 1° 36′ 49″. In a field north of the Oak, which was about 50 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 29	11 3	18 24·4	18 21·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 56	68 23·8	68 22·2
2	11 24	68 21·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V.	11 15	1·7729	1·7737

402. **Grantham.** See "1890 Memoir," p. 152.

403. **Gravesend.** May 1, 1891; W. (70, 94). Lat. 51° 26″ 0′; Long. 0° 23′ 25″ E. In a field belonging to — Arnold, Esq. St. Paul's Church bearing N.N.W.; Milton Hall, W.S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 8	13 47	17 10·7	17 13·0
+5 19	14 46	17 11·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 4	67 16·3	67 16·7
2	16 46	67 16·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 30	1·8339	1·8328
V	14 59	1·8328	

404. GREAT DALBY. October 11, 1890; G. (60, 74). Lat. 52° 42′ 58″; Long. 0° 53′ 43″. In a large field S. of the village, behind Goodson's Farm, which bore 15° W. of N., about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 48	h. m. 11 44	° ′ 18 31·6	° ′ 18 30·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 1	68 18·7	68 18·5
2	13 20	68 19·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 24	1·7765	1·7769
V	11 59		

405. GREAT DRIFFIELD. August 5, 1889; R. (60, 74). Lat. 54° 0′ 12″; Long. 0° 26′ 25″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 50	h. m. 15 17	° ′ 18 40·2	° ′ 18 31·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 8	69 6·4	69 3·9
2	17 32	69 4·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	18 2	1·7106	1·7134
V	15 36	1·7109	

406. Great Grimsby. August 19, 1889; R. (60, 74). Lat. 53° 33′ 15″; Long. 0° 5′ 31″. About a mile south of the town; 100 yards W. of the road from Grimsby to Scartho, and 250 yards N. of the road to Laceby, which meets the Scartho Road nearly at right angles.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 9			
−0 39	12 21	18 7·4	17 58·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 34	68 49·7	
2	11 58	68 49·5	68 48·0

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 13	1·7323	
V	12 42	1·7320	1·7348

407. Greenwich. As the instruments in use at Greenwich have not been compared with those employed in the survey, this observatory has not been included among the stations of the 1891 Survey. See "1890 Memoir," p. 256.

408. GROSMONT. August 12, 1892; G. (60, 74). Lat. 54° 26′ 45″; Long. 0° 44′ 36″. In a field on the E. side of the road between Egton and Grosmont; about $\frac{1}{4}$ mile S.E. of the turning by East End Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 36	11 44	18 13·5	18 24·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 37	69 15·0	69 16·8

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 15		
V	11 55	1·7043	1·7012

409. GUERNSEY (L'ERÉE). See "1890 Memoir," p. 152.

410. GUERNSEY (PETER PORT). See "1890 Memoir," p. 152.

411. GUILDFORD. September 13, 1890; G. (60, 74). Lat. 51° 14′ 12″; Long. 0° 32′ 53.″ In a field on the N. side of Warren Road, about 1 mile E. of the town. About 300 yards due E. of a new Golf Club-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 15	11 13	17 32·5	17 31·6
+2 17	14 37	17 34·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	12 46	67 13·5	67 13·3
2	13 7	67 14·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 59		1·8406
V	11 28	1·8416	
V	14 48	1·8384	

412. GUISBOROUGH. August 11, 1892; G. (60, 74). Lat. 54° 32′ 16″; Long. 1° 2′ 50″. In a field on the E. side of the town, 120 yards from Church Street; the Church tower bore 13° W. of S., about 250 yards distant, and the Grammar School a little E. of S., 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° '	° '
−2 26	9 54	18 20·9	18 31·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	10 27	69 23·4	69 25·2

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 3	1·6958	1·6928

413. HALESOWEN. September 13, 1890; B. (61, 83). Lat. 52° 27′ 14″; Long. 2° 2′ 58″. In a field opposite the Drill Hall in the Dudley Road. The Church bore S., and the N. end of the Drill Hall 80° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 45	10 52	18 12·0	18 10·4
+2 36	14 22	18 12·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 59	68 16·6	68 17·5
2	13 33	68 19·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 49		
V	11 15	1·7721	1·7725
V	14 4	1·7716	

414. HALESWORTH. September 12, 1892; G. (60, 74). Lat. 52° 20′ 20″; Long. 1° 30′ 10″ E. In a meadow E. of the main road running S. out of the village; 40 yards S.E. of a Primitive Methodist Chapel. Church-tower bore 10° E. of N., about $\frac{1}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0
h. m.	h. m.	° ′	° ′
−1 5	11 2	16 40·8	16 51·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 35	67 45·9	67 48·0
83 1	10 47	67 46·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 33	1·7984	1·7954
V	11 12		

415. Haltwhistle. May 17, 1892; G. (60, 74). Lat. 54° 58′ 26″; Long. 2° 27′ 38″. In a field about ¼ mile N. of the village, 100 yards E. of the road to Combe Hill. The School bore S.E., 200 yards distant, and Kennedy's Farm, S.W., 150 yards distant.

Declination.

Σ	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 7	10 13	19 15·9	19 25·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 26	69 48·1	69 49·3
2	11 38	69 47·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 48	1·6710	1·6682
V	10 25		

416. HAMPTON. September 15, 1892; W. (70, 94). Lat. 52° 28′ 32″; Long. 2° 23′ 1″. In a field about 400 yards N.W. of Hampton Farm-house, and immediately to the N.W. of the point where three roads meet.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 54	11 26	18 26·2	18 37·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 49	68 19·4	68 22·4
2	12 2	68 21·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 48		
V	12 24	1·7638	1·7604

417. HARBOTTLE. May 21, 1892; G. (60, 74). Lat. 55° 19′ 52″; Long. 2° 5′ 50″. In a field about ½ mile S.E. of the village; 120 yards S. of the road to Rothbury, and 30 yards W. of a lane running by the edge of a pine-wood on to Harbottle Common.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 7	11 49	19 2·3	19 12·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 57	69 52·1	69 54·0
2	12 47	69 53·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		
V	11 59	1·6700	1·6672

418. Harby. October 9, 1890; G. (60, 74). Lat. 52° 52′ 10″; Long. 0° 53′ 49″. In a field S. of the White Hart Inn, about 120 yards from the road; Windmill bore 50° W. of N., about $\frac{1}{3}$-mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	10 55	18 14·7	18 13·9
+1 43	13 54	18 16·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 29	68 23·8	68 24·3
2	12 47	68 25·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 42		
V	11 11	1·7679	1·7680
V	14 7	1·7672	

419. HARPENDEN. See "1890 Memoir," p. 154.

420. HARROGATE. July 16, 1889; R. and R. (60, 74). Lat. 53° 59′ 18″; Long. 1° 31′ 40″. On the Stray, near the Prince of Wales' Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 27	h. m. 12 27	° ′ 18 51·5	° ′ 18 41·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 12	69 18·7	69 15·5
2	13 25	69 15·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 30	1·7100	1·7119
V	13 50	1·7084	

421. HARWICH. See "1890 Memoir," p. 153.

422. HASLEMERE. See "1890 Memoir," p. 154.

423. HASSOCK'S GATE. July 4, 1890; B. (61, 83). Lat. 50° 55′ 40″; Long. 0° 9′ 5″. In a field belonging to Mr. BROAD. 80 yards W. of the main road from London to Brighton.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 53	h. m. 10 55	° ′ 17 24·1	° ′ 17 21·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 1	67 2·0	67 1·2
2	15 38	67 1·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8		
V	11 19	1·8486	1·8495

424. Haverfordwest. August 26, 1890; B. (61, 83). Lat. 51° 47′ 57″; Long. 4° 57′ 9″. In a field on the W. side of the road to Uzmaston, close to the turning leading to Cotts Park. On the slope of a hill which faces N. The Railway Bridge over the river bore W. The Church 70° W. of N., and some farm buildings on the E. side of the road 30° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 19	11 49	19 32·8	19 30·2
	15 18	19 32·4	

Inclination.

Needle.	G.M.T.	θ.	$_0$.
	h. m.	° ′	° ′
1	13 58	68 17·1	68 15·9
2	14 34	68 16·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 52		
V	12 12	1·7800	1·7789
V	15 40	1·7763	

425. Hawes. July 23, 1889; R. and R. (60, 74). Lat. 54° 18′ 8″; Long. 2° 11′ 50″. About 100 yards S. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 9	11 25	19 37·9	19 28·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 56	69 34·0	69 32·4
2	11 32	69 34·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 39	1·6861	1·6892
V	11 56	1·6865	

426. Hay. April 18, 1891; G. (60, 74). Lat. 52° 4′ 40″; Long. 3° 7′ 54″. In a field belonging to Mrs. Crichton, between the house and the road to Clyro, About $\frac{1}{4}$ mile from the bridge over the Wye. Hay Church, about $\frac{1}{2}$ mile away bore 10° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 54	11 3	18 57·3	18 59·3
+1 22	13 54	18 57·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 20	68 15·9	68 15 4
2	12 41	68 13·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 44		1·7712
V	11 17	1·7728	
V	14 7	1·7707	

427. **Hayfield.** August 11, 1890; R. and T. (70, 94). Lat. 53° 22′ 40″; Long. 1° 55′ 53″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 5	17 31	18 39·1	18 36·4

Inclination.

Needle.	G.M.T.	δ.	δ_0.
	h. m.	° ′	° ′
1	17 30	68 47·9	68 47·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 45	1·7316	1·7324

428. **Heathfield.** July 8, 1890; B. (61, 83). Lat. 50° 58′ 32″; Long. 0° 16′ 17″ E. In a field behind the Crown Inn; about 100 yards from the Inn, which bore S.S.E.; Tollenshaw Obelisk bore E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h m.	° ′	° ′
+3 42	13 2	17 7·9	17 5·1
+6 38	18 2	17 8·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 32	67 0·0	66 59·6
2	17 30	67 0·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 27		1·8471
V	13 26	1·8467	
V	18 27	1·8457	

429. HELMSLEY. May 11, 1891; W. (70, 94). Lat. 54° 14′ 55″; Long. 1° 3′ 25″. In a field on the N. side of the village; Church bearing S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 34	11 4	18 39·2	18 42·6
+2 51	15 20	18 41·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 20	69 19·8	69 19·7
2	13 52	69 18·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 12		1·7028
V	11 21	1·7047	
V	15 33	1·7020	

430. Helston. August 2, 1890 ; G. (60, 74). Lat. 50° 5′ 15″ ; Long. 5° 15′ 35″. On some common land, just over 1 mile S.E. of the town ; 100 yards W. of the road to the Lizard, and 100 yards S. of a cricket field.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 10	14 22	19 31·8	19 28·1
+3 1	15 50	19 30·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 57	67 7·4	67 6·6
2	13 19	67 7·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 11		1·8470
V	11 39	1·8468	
V	14 9	1·8454	

431. Hemyock. Aug. 28, 1890 ; G. (60, 74). Lat. 50° 55′ 15″ ; Long. 3° 13′ 32″. In the N. corner of a field adjoining the Culm Valley Inn, near the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 12	14 49	18 46·5	18 43·0
+4 40	17 23	18 44·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 16	67 24·8	67 24·1
2	16 40	67 24·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 31		1·8284
V	15 2	1·8283	
V	17 34	1·8271	

432. Henley-on-Thames. August 4, 1890; B. (61, 83). Lat. 51° 32′ 40″; Long. 0° 54′ 14″. In a field belonging to Swiss Farm, about ½ mile N. of the town. 60 yards N. of the farm-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 20	11 8	17 39·5	17 36·7
	15 24	17 39·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 10	67 39·5	67 37·9
2	15 0	67 37·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 2	1·8156	1·8164
V	11 47		

433*a*. Hereford. See "1890 Memoir," p. 231.

433*b*. **Hereford.** April 17, 1891; G. (60, 74). Lat. 52° 1′ 56″; Long. 2° 43′ 40″. In a meadow on the S. side of a bye-road, which turns out of the Ross Road, a little past the bridge over the Abergavenny Railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 31	11 2	18 54·4	18 57·0
+1 28	14 0	18 55·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 28	68 8·6	68 8·5
2	12 51	68 7·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 46		
V	11 18	1·7812	1·7801
V	14 12	1·7801	

434. **Hesket Newmarket.** August 9, 1892; W. (70, 94). Lat. 54° 44′ 29″; Long. 3° 1′ 48″. 50 yards N. of the road leading to Caldbeck, and about 100 yards N.W. of the highest point on this road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h m.	h. m.	° ′	° ′
+3 28	15 38	19 42·1	19 53·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 39	69 46·0	69 48·0
2	14 55	69 46·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 31		
V	16 8	1·6776	1·6744

435. Hexham. May 18, 1891; W. (70, 94). Lat. 54° 58′ 38″; Long. 2° 7′ 20″. In a field on the S. side of the Carlisle Road; just beyond the cross-road leading to the Spital. Cemetery bearing N.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 57	11 39	19 9·2	19 12·7
+4 49	16 28	19 11·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 23	69 46·1	69 46·5
2	14 56	69 45·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 46		1·6741
V	12 13	1·6747	
V	16 40	1·6749	

436. **High Wycombe.** August 26, 1892; R. (73, 99). Lat. 51° 38′ 50″; Long. 0° 43′ 31″. In a field 300 yards N.E. of Terriers House, and 20 yards from the public footpath.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 34	15 9	17 54·0	18 5·4
+5 17	17 9	17 55·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 32	67 42·3	67 44·0
2	16 51	67 41·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 58	1·8078	1·8045
V	15 22		

437. **Hinckley.** April 29, 1892; G. (60, 74). Lat. 52° 32′ 43″; Long. 1° 22′ 35″. Near the centre of a field on the W. side of the road to Dadlington, and about 300 yards from the cross roads to Nuneaton and Stapleton.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 35	10 48	18 15·1	18 23·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	12 17	68 18·1	68 19·5
2	12 3	68 17·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 29		
V	11 3	1·7656	1·7629

438. HOLSWORTHY. August 18, 1890; G. (60, 74). Lat. 50° 48′ 58″; Long. 4° 20′ 40″. In a field N. of the town, on the E. side of the road. Holsworthy Church tower bore 30° W. of S., about 1 mile distant. Windmill 14° E. of S., about 1 mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° '	° '
−1 40	11 6	19 17·3	19 16·0
+2 6	14 18	19 19·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	12 33	67 33·9	67 32·3
2	12 56	67 31·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 50		1·8218
V	11 22	1·8216	
V	14 6	1·8206	

439. Holt. September 23, 1890; G. (60, 74). Lat. 52° 53′ 43″; Long. 1° 5′ 28″ E. In a field nearly 1 mile S. of the town, 100 yards E. of the road to Hunworth; the gate of Holt Lodge bore 8° W. of N., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 46	11 31	17 15·3	17 14·1
+2 25	14 30	17 16·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 49	68 16·5	68 14·5
2	13 10	68 13·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 11		1·7714
V	11 45	1·7707	
V	14 41	1·7711	

440. Holyhead. See "1890 Memoir," p. 155.

441. Hopton Wafers (Cleobury Mortimer). September 19, 1890; B. (61, 83). Lat. 52° 22′ 51″; Long. 2° 32′ 2″. The Church bore 30° E. of N., and the Lodge of Hopton Court 70° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 3	11 41	18 53·2	18 52·2
	15 56	18 54·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 21	68 19·3	68 17·6
2	15 3	68 16·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 3		1·7671
V	12 18	1·7657	
V	15 37	1·7674	

442. HORNCASTLE. August 22, 1889; R. (60, 74). Lat. 53° 12′ 30″; Long. 0° 6′ 15″. Between the Mareham and Tattershall Roads. About ½ mile south of the town.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 14	9 56	18 1·0	17 52·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 43	68 36·1	68 34·4
2	11 1	68 36·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 30	1·7474	1·7502
V	10 16	1·7480	

443. HORSHAM. See "1890 Memoir," p. 156.

444. **Howden.** August 10, 1889; R. (60, 74). Lat. 53° 45′ 21″; Long. 0° 51′ 45″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 13	10 31	18 31·9	18 22·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 18	69 2·2	69 0·5
2	11 35	69 2·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 40	1·7233	1·7261
V	12 2	1·7236	

445. **Huddersfield** (South Crossland). October 3, 1890; G. (60, 74). Lat. 53° 36′ 41″; Long. 1° 49′ 45″. About 5 miles from Huddersfield, in a field a little W. of South Crossland; about $\frac{1}{2}$ mile W. of the Village Church. 40 yards N. of a bye-road running W. from the Village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 43	11 7	18 44·2	18 43·0
+1 11	13 27	18 45·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 5	69 5·1	69 3·8
2	12 28	69 3·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 28	1·7197	1·7202

446. **Hull.** See "1890 Memoir," p. 156.

447. **Hunstanton.** September 24, 1890; G. (60, 74). Lat. 52° 56′ 51″; Long. 0° 30′ 18″ E. In a field E. of the road to Old Hunstanton, just over a mile from the Railway Station. Lighthouse 65° W. of N., 300 yards distant. 30 yards distant from a gate opening into a bye-lane running E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 10	11 4	17 29·3	17 27·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 29	68 21·7	68 21·2
2	12 49	68 21·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 49	1·7636	1·7641
V	11 23		

448. **Hythe.** July 12, 1890; B. (61, 83). Lat. 51° 4′ 7″; Long. 1° 4′ 42″ E. At the middle of the Recreation Ground. The Church bore N.E. and the gasometer S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 36	11 7	16 38·2	16 36·3
	14 20	16 39·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 11	67 0·1	66 59·0
2	13 44	66 59·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 5		
V	11 28	1·8484	1·8489
V	14 55	1·8476	

449. **Ilfracombe.** See "1890 Memoir," p. 157.

450. **Ilkley.** July 30, 1889; R. (60, 74). Lat. 53° 55′ 44″; Long. 1° 49′ 38″. Middleton Park, about 100 yards from the entrance.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 39	10 57	18 50·0	18 39·8
+1 18	13 7	18 48·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 20	69 16·7	69 14·0
2	12 46	69 14·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 37	1·7087	1·7115

451. Ilminster. July 18, 1890; G. (60, 74). Lat. 50° 55′ 27″; Long. 2° 54′ 40″. In the cricket-field S. of the town, about 50 yards from the gate. About 400 yards N.E. of the schools.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 37	11 11	18 33·5	18 30·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 16	67 20·9	67 20·5
2	12 44	67 21·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 28		
V	11 23	1·8304	1·8313

452. Ipswich. September 18, 1890; G. (60, 74). Lat. 52° 3′ 22″; Long. 1° 12′ 35″ E. On Rushmere Heath, between 2 and 3 miles E. of the town; near the S. side of the Heath. An Asylum bore 50° W. of S., about ¾ mile distant. About ¾ mile S. by W. of a windmill.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 58	11 30	16 51·7	16 50·2
+2 26	14 47	16 52·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 3	67 41·7	67 40·1
2	13 24	67 39·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 19		1·8101
V	11 44	1·8101	
V	15 4	1·8090	

453. Ireby. August 9, 1892; W. (70, 94). Lat. 54° 44′ 31″: Long. 3° 10′ 58″. 100 yards N.E. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 50	11 49	19 41·7	19 53·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 30	69 51·3	69 53·3
2	12 45	69 51·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 0	1·6685	1·6653

454. **Jersey, Grouville.** See "1890 Memoir," p. 158.

455. **Jersey, St. Louis.** See "1890 Memoir," p. 158.

456. **Jersey, St. Ouen.** See "1890 Memoir," p. 158.

457. **Kegworth.** May 5, 1892; G. (60, 74). Lat. 52° 50′ 10″; Long. 1° 15′ 10″. In a field on the N. side of the road to Melton, about 250 yards E. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 22	12 47	18 0·7	18 9·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 22	68 28·5	68 29·6
2	13 10	68 27·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 9		
V	12 36	1·7598	1·7572

458. **Kendal.** August 18, 1890; R. and T. (70, 94). Lat. 54° 18′ 19″; Long. 2° 45′ 5″. In a field about a mile to the S. of the town and between the Orphan's Home and Collinfield Farm. Collinfield Farm bore due N. and the Orphanage S.S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 56	17 27	19 33·2	19 30·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 26	69 32·5	69 32·3
2	18 21	69 33·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 58	1·6896	1·6903

459. **Kenilworth.** See "1890 Memoir," p. 159.

460. **Keswick.** August 22, 1890; R. and T. (70, 94). Lat. 54° 36′ 2″; Long. 3° 9′ 23″. In the kitchen-garden of the Derwentwater Hotel, Portinscale, 200 yards from the Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 41	11 10	19 40·4	19 37·5
+2 11	14 7	19 40·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 38	69 40·8	69 40·6
2	13 0	69 41·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 53		
V	11 23	1·6832	1·6839

461. Kettering. See "1890 Memoir," p. 159.

462. Kettlewell. July 25, 1889: R. and R. (60, 74). Lat. 54° 8′ 53″; Long. 2° 2′ 51″. In a field about 100 yards from the Racehorse Inn. A quarter of a mile W. of the church.

Declination.

Σ.	G.T.M.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−3 37	8 56	19 0·3	18 50·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	9 11	69 23·1	69 20·8
2	10 45	69 21·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	9 33	1·7032	1·7063

463*a*. KEW. See "1890 Memoir," pp. 160, 161, 162.

The values of the elements used for Kew in the 1886 survey were those published for January, 1886. As we did not know the differences between our survey instruments and those in use at Greenwich and Stonyhurst, we treated all the observatories alike, and did not reduce them to the Survey Standard.

The values for January, 1886, when reduced to January, 1891, by Table XIV., p. 531, are

$\delta = 17^\circ\ 45'\cdot0.$ $\quad H = 1\cdot8193.$ $\quad \theta = 67^\circ\ 31'\cdot1.$

The actual monthly means observed at Kew in January, 1891, were

$\delta = 17^\circ\ 45'\cdot7.$ $\quad H = 1\cdot8184.$ $\quad \theta = 67^\circ\ 31'\cdot8.$

As we now know, both from our own experience and from the observations of Dr. RIJCKEVORSEL, that the differences between Standard magnetic instruments are considerable, in the present paper we (1) reduce Kew to Survey Standard, (2) describe observations made with the Survey instruments at Stonyhurst, and (3) do not calculate the disturbing forces at Greenwich, the instruments at which have not yet been compared with those at Kew.

Hence, the values finally adopted for January, 1891, as deduced from the epoch of the 1886 survey, are

$\delta = 17^\circ\ 42'\cdot5.$ $\quad H = 1\cdot8216.$ $\quad \theta = 67^\circ\ 31'\cdot1.$

463*b*. KEW.

The means of the monthly means of the elements for December, 1890, and January, 1891, at Kew are

$\delta = 17^\circ\ 46'\cdot2.$ $\quad H = 1\cdot8175.$ $\quad \theta = 67^\circ\ 31'\cdot7.$

Reduced to Survey Standard, these become

$\delta = 17^\circ\ 43'\cdot7.$ $\quad H = 1\cdot8198.$ $\quad \theta = 67^\circ\ 31'\cdot7.$

These are taken as the values for the epoch of the New Survey.

464. KIDDERMINSTER. September 17, 1890; B. (61, 83). Lat. 52° 22′ 49″; Long. 2° 15′ 27″. In Brinton Park, on the Stourport Road. The chimney stack of Green's Carpet Works bore 60° E. of N., the old waterworks reservoir S.S.W., and the spire of the mortuary chapel 10° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 7	11 28	18 31·2	18 29·7
	15 41	18 32·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 13	68 14·9	68 13·1
2	14 50	68 12·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 40		1·7698
V	12 2	1·7692	
V	15 20	1·7692	

465. KING'S LANGLEY. July 29, 1890; R. and T. (70, 94). Lat. 51° 43′ 43″; Long. 0° 26′ 59″. At Nash Mills. In the grounds of Sir JOHN EVANS. In front of the house, and about half-way between the house and the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 7	10 34	17 53·4	17 50·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 9	67 39·9	67 39·4
2	10 28	67 40·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 35		
V	10 51	1·8176	1·8186
V	11 5	1·8179	

466 *a* and *b*. KING'S LYNN. See "1890 Memoir," p. 163.

467. KING'S SUTTON. See "1890 Memoir," p. 163.

468. KINGSWOOD. August 23, 1892; R. (73, 99). Lat. 52° 20′ 27″; Long. 1° 43′ 18″. In a field on the E. side of the railway, 200 yards N. of the Station, and 150 yards from the railway.

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 4	68 19·0	68 21·3
2	15 32	68 19·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 32	1·7705	1·7672

469. KINGTON. September 23, 1890; B. (61, 83). Lat. 52° 12′ 6″; Long. 3° 1′ 42′. In a field at the back of the Burton House Hotel. The Church bore W.N.W., about 20 yards from the river bank.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−3 2	9 17	19 15·9	19 14·2

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	9 34	1·7720	1·7725

470. KIRKBY LONSDALE. August 28, 1890; R. and T. (70, 94). Lat. 54° 11′ 59″; Long. 2° 35′ 58″. In a field to the W. of the town. Low Bygins bore S.W., and was half a mile distant. The Grammar School bore W. by S., and was 300 yards distant.

Declination.

Σ	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 58	10 45	19 19·2	19 16·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 43	69 25·8	69 24·7
2	11 20	69 24·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 52		
V	11 3	1·6999	1·7000
V	11 20	1·6988	

471. **Kirkby Stephen.** July 22, 1889; R. and R. (60, 74). Lat. 54° 28 21″; Long. 2° 21′ 0″. In a field to the W. of the town.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 46	10 33	19 32·0	19 22·7
+0 30	13 2	19 33·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 6	69 37·4	69 35·6
1	11 37	69 36·6	
2	10 56	69 37·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 0	1·6808	1·6838
V	10 55	1·6810	

472. **Knighton.** September 3, 1892; W. (70, 94). Lat. 52° 20′ 31″; Long. 3° 3′ 2″. To the S.W. of the town, and about 30 yards N. of a road leading from near Brynan Castle to Brookhouse, 500 yards from the point where this road leaves the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 46	16 13	19 4·9	19 16·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 32	68 16·9	68 19·2
2	16 47	68 17·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	17 31 17 3	1·7730	1·7694

473. LAMPETER. See "1890 Memoir," p. 164.

474. LANCASTER. August 16, 1890; R. and T. (70, 94). Lat. 54° 2′ 14″; Long. 2° 48′ 22″. In a field between the railway and the canal, to the S. of the Castle, which was about ½ a mile distant. About 150 yards from the canal.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 29	16 8	19 25·4	19 22·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 2	16 30 17 11	69 18·6 69 18·8	69 18·2

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V V	16 24 16 39	1·7050 1·7049	1·7057

475. **Launceston.** August 15, 1890; G. (60, 74). Lat. 50° 38′ 48″; Long. 4° 20′ 57″. About 1 mile N.E. of the town, in a field just by the junction of the roads from Launceston and St. Stephen's.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	11 30	19 6·6	19 3·9
+2 1	14 13	19 6·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 7	67 20·0	67 19·0
2	12 29	67 19·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h m.		
D	13 1		1·8405
V	13 43	1·8403	
V	15 3	1·8391	

476. **Ledbury.** April 16, 1891; G. (60, 74). Lat. 52° 1′ 29″; Long. 2° 26′ 25″. In a meadow on the S. side of the road to Ross, about ¼ mile from the point where it leaves the Gloucester Road. Ledbury Church bore N.E. about 1½ miles distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 11	18 28·1	18 29·5
+1 35	14 2	18 26·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	°
1	12 43	68 8·4	68 8·4
2	13 3	68 7·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 2		1·7782
V	11 26	1·7785	
V	14 14	1·7792	

477. LEEDS. See "1890 Memoir," p. 165.

478. LEICESTER. See "1890 Memoir," p. 165.

479. LEIGHTON BUZZARD. July 30, 1890; R. and T. (70, 94). Lat. 51° 54′ 48″; Long. 0° 40′ 1″. In a field between the Parish Church and the canal. The steeple bore E.N.E. The tower of a church in the suburbs bore W.N.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° '	° '
+2 45	15 18	18 2·0	17 59·3
+3 34			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	15 57	67 51·9	67 51·2
2	16 17	67 51·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 18		1·7973
V	15 32	1·7965	

480. **Leominster.** September 3, 1892; W. (70, 94). Lat. 52° 13′ 25″; Long. 2° 44′ 1″. In a field at the back of the houses on the S. side of the road leading W. from the Railway Station. About 400 yards from the railway and 40 yards S. of the garden wall.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −3 3	h. m. 9 25	° ′ 18 36·9	° ′ 18 48·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 28	68 11·6	68 14·1
2	10 45	68 12·2	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 11 13	1·7800	1·7764

481. **Levisham.** August 15, 1892; G. (60, 74). Lat. 54° 18′ 20″; Long. 0° 43′ 13″. In a field 200 yards N. of the village; by the S. edge of a small quarry. Between two roads leading to the Moor; 20 yards E. of one, and 120 yards W. of the other. A chapel bore 10° E. of S., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 41	h. m. 11 38	° ′ 18 18·4	° ′ 18 29·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 26	69 15·5	69 16·9
83 1	12 37	69 14·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 7		
V	11 48	1·7049	1·7018

482. Lewes. June 27 and July 7, 1890; B. (61, 83). Lat. 50° 51′ 50″; Long. 0° 0′ 50″ E. In a field near Rise Farm, 200 yards S.S.E. of the Priory ruins. The observations on July 7 were made about 100 yards behind the Prison.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
June 27	+1 43	11 37	17 17·1	17 14·0
		14 14	17 17·1	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 7	1	11 47	67 1·0	66 59·7
	2	14 37	66 59·9	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
June 27	V	12 16	1·8522	1·8532

483. **Lew Trenchard.** August 14, 1890; G. (60, 74). Lat. 50° 39′ 17″; Long. 4° 12′ 37″. In a field on the S. side of the road from Launceston to Lew Trenchard; between Port Gate and Lew Cross. About 50 yards E. of the turning to Stowford.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 7	12 1 15 14	19 9·0 19 8·3	19 6·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 52	67 20·7	67 19·5
2	14 13	67 19·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 37		
V	12 13	1·8399	1·8399
V	15 1	1·8383	

484. **Lichfield.** May 9, 1892; G. (60, 74). Lat. 52° 41′ 18″; Long. 1° 50′ 37″. In a field on the N. side of the road to Burntwood, about ¼ mile from the point where it leaves the Stafford road. Lodge at an entrance to Mr. Seccombe's estate, just by a bend in the road, bore 40° S. of E., about 80 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 29	10 58	18 35·3	18 44·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 27	68 32·9	68 33·3
2	12 14	68 30·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 42		
V	11 20	1·7525	1·7498

485*a*. Lincoln. See "1890 Memoir," p. 166.

485*b*. Lincoln. August 27, 1892; G. (60, 74). Lat. 53° 12′ 47″; Long. 0° 31′ 44″. On the South Common; 70 yards N.W. of the S.E. corner of the Common, and nearly opposite the turning to Canwick.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 47	10 28	17 37·4	17 47·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 11	68 33·6	68 35·4
83 1	11 24	68 33·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 41	1·7511	1·7481

486. LINTON (CAMBS.). June 18 and 19, 1890; G. (60, 74). Lat. 52° 5′ 53″; Long. 0° 16′ 43″ E. Near the top of the field behind the "Swan" Hotel; the Church-tower bore S.S.W.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
June 18	−2 28	10 37	17 35·5	17 31·4
,, ,,	+3 28	14 58	17 35·4	
,, 19	−1 28	10 53	17 34·1	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
June 18	1	12 26	67 51·1	67 50·3
	2	12 53	67 51·2	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
June 18	D	11 29		1·7950
,, ,,	V	10 56	1·7950	
,, ,,	V	14 48	1·7929	

487. LIZARD DOWN. August 5, 1890; G. (60, 74). Lat. 49° 58′ 50″; Long. 5° 12′ 34″. On Lizard Down, on the W. side of the road from Helston to the Lizard. An old windmill, ¾ mile distant, bore 30° W. of N. A flagstaff, near the Lizard, bore 10° E. of S., rather more than 1 mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 26	11 30	19 26·0	19 24·3
+2 28	14 45	19 27·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 24	67 1·4	67 0·7
2	13 51	67 1·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 19		1·8523
V	11 46	1·8530	
V	14 27	1·8497	

488. Llandilo. May 20, 1892; W. (70, 94). Lat. 51° 52′ 38″; Long. 3° 59′ 56″. To the S.W. of the town, and near the N. end of the field which extends from the railway to the river. About 400 yards S.W. by W. of the bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 26	11 42	19 10·7	19 20·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 20	68 17·4	68 19·4
2	12 37	68 17·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 14		
V	13 46	1·7717	1·7688

489. **Llandovery.** August 23, 1890; B. (61, 83). Lat. 51° 59′ 31″; Long. 3° 47′ 58″. In a small field, belonging to the Castle Hotel, on the E. side of the road to Llandilo, and just S. of the bend leading to the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 27	11 31	19 15·5	19 13·1
+2 5	14 54	19 15·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 38	68 19·2	68 18·0
2	14 0	68 17·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 35		
V	11 55	1·7689	1·7697
V	15 11	1·7690	

490. **Llandrindod.** September 7, 1892; W. (70, 94). Lat. 52° 14′ 22″. Long. 3° 23′ 14″. 200 yards S.W. of the Rock House Hotel, on the N. bank of the river where it is joined by a small stream.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 10	11 14	19 0·8	19 12·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 40	68 17·0	68 19·4
2	11 52	68 17·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 41		
V	12 12	1·7738	1·7703

491. Llandudno. See "1890 Memoir," p. 167.

492. Llandyssil. August 29, 1890; B. (61, 83). Lat. 52° 2′ 21″; Long. 4° 18′ 12″. About 150 yards S. by E. of the Church, and 80 yards from the river bank.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 57	10 49	19 40·0	
+2 19	13 45	19 41·2	19 39·1
	14 2	19 43·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 30	68 21·7	68 20·2
2	13 9	68 19·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 12	1·7692	
V	11 32	1·7684	1·7697
V	14 22	1·7693	

493. Llanelly. August 21 and 25, 1890; B. (61, 83). Lat. 51° 41′ 58″; Long. 4° 9′ 48″. In a field belonging to Tyllwyd Farm, about 1¼ miles N. of the town, 200 yards above the Trebeddod reservoir. An air-shaft on the opposite side of the reservoir bore 10° W. of S.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Aug. 25	−1 13	11 36	19 16·2	19 13·7

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 21	1	13 5	68 6·8	68 4·9
	2	13 29	68 4·2	
	1	13 50	68 5·5	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 21	D	16 9		1·7901
,, 21	V	12 4	1·7905	
,, 21	V	15 40	1·7882	

494. Llanfair. September 13, 1892; W. (70, 94). Lat. 52° 39′ 49″; Long. 3° 18′ 0″. 80 yards S.E. of the first milestone from Llanfair, along the road to Meifod. 150 yards S. of Hemiarth Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 46	11 38	19 9·5	19 21·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 9	68 34·3	68 37·0
2	13 24	68 35·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 26	1·7531	1·7495
V	11 59		

495. LLANFYLLIN. April 22, 1891; G. (60, 74). Lat. 52° 45′ 52″; Long. 3° 16′ 28″. In a field on the hill-side adjoining the village, and about $\frac{1}{4}$ mile S.W. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 12	1 43	19 24·4	19 26·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 15	68 37·8	68 38·7
2	12 37	68 38·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 20	1·7482	1·7472
V	10 51	1·7474	
V	11 44		

496. **Llangollen.** See "1890 Memoir," p. 167.

497. **Llanidloes.** See "1890 Memoir," p. 168.

498. **Longridge.** September 15, 1891; W. (70, 94). Lat. 53° 49′ 17″; Long. 2° 35′ 44″. In a field to the S.E. of Waterworks Farm. Longridge Church bore 30° W. of N., and the Vicarage due N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 19	13 58	19 5·6	19 10·8
+3 12	15 38	19 5·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0
	h. m.	° ′	° ′
1	16 12	69 9·7	69 11·3
2	16 36	69 10·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 57		
V	14 28	1·7153	1·7132
V	17 4	1·7136	

499. **Loughborough.** See "1890 Memoir," p. 169.

500. **Looe.** July 29, 1890; G. (60, 74). Lat. 50° 21′ 20″; Long. 4° 27′ 24″. On West Looe Down, overlooking East Looe. The Jetty bore S.E., $\frac{3}{4}$ mile distant, and the new Guildhall Tower E., $\frac{1}{2}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 41	11 8	19 9·9	19 6·6
+2 14	14 22	19 8·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 45	67 13·0	67 11·8
2	13 12	67 12·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 0		1·8424
V	11 30	1·8421	
V	14 8	1·8408	

501. LOUTH. August 20, 1889; R. (60, 74). Lat. 53° 21′ 55″; Long. 0° 1′ 43″. About a mile W. of the town the roads to Burgh and Ludford divide. The observations were made in a field to the N. of the road about 200 yards E. of the point of bifurcation.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 0	10 22	18 7·5	17 58·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 17	68 42·6	68 39·9
2	11 34	68 40·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8	1·7399	1·7427
V	10 46	1·7404	

502. Lowestoft. See "1890 Memoir," p. 169.

503. Lynton. August 25, 1890; G. (60, 74). Lat. 51° 13′ 5″; Long. 3° 49′ 38″. In a field E. of the bye-road leading up to West Lynn Farm, about 1 mile N. of Lynton; the "Valley of Rocks" Hotel bore 20° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 20 +2 10	11 17 14 53	19 6·7 19 2·5	19 2·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 2	12 42 13 4	67 44·3 67 41·6	67 42·4

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	11 57 11 30	1·8084	1·8091

504*a*. Mablethorpe. See "1890 Memoir," p. 170.

504*b*. Mablethorpe. August 30, 1892; G. (69, 74). Lat. 53° 20′ 15″; Long. 0° 15′ 41″ E. In a field 40 yards E. of the road, and 400 yards S. of the "Book-in-Hand" Hotel; 60 yards from a small chapel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 57	10 16	17 29·8	17 40·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 59	68 38·8	68 40·2
83 1	11 10	68 38·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 33	1·7491	1·7460

505. MACHYNLLETH. September 1, 1890; B. (61, 83). Lat. 52° 35′ 8″; Long. 3° 50′ 3″. On a piece of open land on the S. side of the Llanidloes Road, and about 1 mile E. of the town. About 100 yards from the road, and 200 yards from the foot of the hill. The church bore 60° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 8			
+4 1	11 37	19 25·9	19 23·0
+4 31	15 28	19 24·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 58	68 34·2	68 33·2
2	14 40	68 33·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 43		
V	11 57	1·7545	1·7549
V	15 46	1·7539	

506. **Maiden Newton.** July 15, 1890; G. (60, 74). Lat. 50° 46′ 30″; Long. 2° 34′ 35″. At the top of a sloping field W. of the Village, about ¾ mile due S. of the church. A single-arch railway bridge bore 5° S. of E., about ¾ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 26	14 9	18 18·3	18 15·4
+3 5	15 47	18 18·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 43	67 14·5	67 14·1
2	13 3	67 15·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 57		
V	14 23	1·8396	1·8392
V	16 0	1·8370	

507. **Maidstone.** July 16, 1890; B. (61, 83). Lat. 51° 16′ 57″; Long. 0° 32′ 12″ E. Near a large beech tree in the middle of the grounds of Foley House. About 100 yards S.W. by S. of the house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 16	13 28	17 6·0	17 1·7
	17 25	17 3·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 14	67 12·2	67 10·4
2	16 52	67 10·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 28		1·8389
V	13 46	1·8397	
V	17 53	1·8363	

508. MALTON. August 2, 1889; R. (60, 74). Lat. 54° 8′ 2″; Long. 0° 48′ 8″. In the garden of a house on the outskirts of the town.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 15	17 35	18 49·6	18 40·4

Horizontal Force.

G.M.T.		H.	H_0.
D	18 54	1·7077	1·7103
V	18 15	1·7076	

509. MALVERN. See "1890 Memoir," p. 171.

510. MANCHESTER (OLD TRAFFORD). See "1890 Memoir," p. 172.

511. **Mansfield.** August 24, 1892; G.-(60, 74). Lat. 53° 8′ 18″; Long. 1° 11′ 29″. In a field to the S.E. of the town, between the road to Bury Hill and the Railway; 250 yards N. of the latter. Ten yards E. of a lane which leaves the road about 100 yards S. of a brewery, and runs from the road to the Railway. Church spire due N., about ½ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 54	10 27	18 15·1	18 26·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 59	68 40·6	68 43·1
83 1	11 10	68 41·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 29		
V	10 36	1·7419	1·7387

512. **Manton.** See "1890 Memoir," p. 172.

513. **Marazion.** August 7, 1890; G. (60, 74). Lat. 50° 8′ 15″; Long. 5° 29′ 11″. In a field a short distance N.N.E. of Newtown, on the S. side of the road to Hayle, and about 200 yards S.W. of Ludvaan Lease Farm. The tower on St. Michael's Mount bore 13° W. of S., rather more than 1 mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h m.	° ′	° ′
−1 34	11 26	19 37·1	19 33·8
+2 6	14 21	19 36·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 50	67 11·4	67 10·4
2	13 12	67 11·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 10		
V	11 39	1·8437	1·8444
V	14 8	1·8432	

514. March. See "1890 Memoir," p. 173.

515. Margate. July 15, 1890; B. (61, 83). Lat. 51° 22′ 13″; Long. 1° 21′ 45″ E. At the centre of the field behind Hengrove Farm-house, which bore 20° W. of N. Trinity Church bore 40° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 38	11 5	16 35·7	16 33·5
	15 14	16 36·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 24	67 14·9	67 12·9
2	14 8	67 12·3	

Horizontal Force.

G.M.T.		H.	H.
	h. m.		
D	12 15		
V	11 30	1·8333	1·8348
V	15 36	1·8344	

516. Market Bosworth. April 30, 1892; G. (60, 74). Lat. 52° 37′ 37″; Long. 1° 24′ 12″. In a field on the W. side of the main road running North out of the village. The church-tower bore 25° S. of E., about 400 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 26	h. m. 11 5	° ′ 18 4·4	° ′ 18 13·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 27	68 21·3	68 22·5
2	12 13	68 20·4	

Horizontal Force.

G.M.T.		H.	H_0.
D	11 42	1·7625	1·7598
V	11 17		

517. Market Drayton. August 31, 1892; W. (70, 94). Lat. 52° 54′ 27″; Long. 2° 29′ 6″. In a field to the E. of the road from the Railway Station to the town. 180 yards N.N.E. of The Towers and 350 yards from the station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 45	h. m. 10 45	° ′ 18 27·4	° ′ 18 38·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 0	68 42·5	68 44·4
2	12 24	68 42·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 28		
V	10 57	1·7413	1 7379

518. Market Harboro'. October 14, 1890 ; G. (60, 74). Lat. 52° 28′ 20″ ; Long. 0° 56′ 8″. In a field S.S.W. of the town, on the road to Farndon-on-the-Hill ; about $\frac{1}{4}$ mile S. of the L. and N.W. Railway (Rugby Branch). Farndon Church-tower bore 30° W. of S., about 1 mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 57	14 16	18 3·6	18 2·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 8	68 8·9	68 8·5
2	15 28	68 8·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 32	1·7759	1·7763

519. MARKET RASEN. August 21, 1889; R. (60, 74). Lat. 53° 23′ 10″; Long. 0° 20′ 35″. In a field on the S. side of the West Rasen and Gainsborough Road, about ½ mile from the railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 37	h. m. 10 44	° ′ 18 6·0	° ′ 17 56·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 33	68 48·9	68 46·4
2	11 47	68 47·1	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 11 3	1·7374	1·7400

520. MARKET WEIGHTON. August 7, 1889; R. (60, 74). Lat. 53° 51′ 48″; Long. 0° 40′ 0″. In a field near the village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 20	h. m. 14 55	° ′ 18 48·5	° ′ 18 39·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 1	69 8·6	69 6·0
2	18 2	69 6·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 15	1·7207	
V	15 15	1·7215	1·7237

521. MARLBOROUGH. April 28, 1892; W. (70, 94). Lat. 51° 23′ 45″; Long. 1° 41′ 55″. In Savernake Forest, 150 yards E.S.E. of Cadley Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 6	13 30	17 27·2	17 35·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 5	67 37·3	67 39·6
2	14 28	67 38·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 50		
V	12 11	1·8162	1·8134

522. MARYPORT. September 7, 1891; W. (70, 94). Lat. 54° 43′ 33″; Long. 3° 29′ 0″. Near the N. end of the field on the W. side of the private road leading down to the shore, which leaves the main road just beyond Nether Hall. The Cemetery bore E.N.E., and Ellen Bank House S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 33	11 11	19 51·3	19 57·3
+1 29	14 3	19 53·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 12	69 51·6	69 53·1
2	12 40	69 52·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 57		1·6636
V	14 15	1·6656	
V	15 57	1·6642	

523. **Masham.** July 18, 1889; R. and R. (60, 74). Lat. 54° 13′ 17″; Long. 1° 39′ 0″. About 100 yards E. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 20	13 2	18 54·9	18 45·2

Inclination.

Needle.	G.M.T.	θ	θ_0.
	h. m.	° ′	° ′
1	10 30	69 30·4	69 27·4
2	10 55	69 28·2	
1	12 6	69 28·8	
2	12 26	69 28·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 19	1·6913	1·6937
V	11 41	1·6908	

524. MATLOCK (Darley). October 6, 1890; G. (60, 74). Lat. 53° 9′ 32″; Long. 1° 34′ 55″. In a field on the N. side of a bye-road, leading out of the road to Darley, opposite the turning to the church. About 250 yards from the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 11	18 27·1	18 25·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 33	68 41·7	68 41·5
2	12 53	68 41·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 51		
V	11 25	1·7452	1·7457

525. MELTON MOWBRAY. See "1890 Memoir," p. 174.

526. MIDDLEWICH. September 28, 1891; W. (70, 94). Lat. 53° 10′ 42″; Long. 2° 27′ 37″. Near the S. end of a field, about 300 yards S.S.W. of Norcroft Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 21	11 7	18 41·7	18 47·5
	11 18	18 42·0	
+2 29	15 2	18 43·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 15	68 44·4	68 45·2
2	13 43	68 43·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 38	1·7429	1·7414

527*a*. MILFORD. See "1890 Memoir," p. 175.

527*b*. MILFORD. May 21, 1892; W. (70, 94). Lat. 51° 42′ 20″; Long. 4° 56′ 50″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	11 5	19 16·9	19 27·3
+1 7	13 50	19 18·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 32	68 0·9	68 3·5
2	12 52	68 2·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 51		1·7907
V	11 22	1·7953	
V	14 2	1·7922	

528. MILLOM. August 12, 1892; W. (70, 94). Lat. 54° 12′ 27″; Long. 3° 16′ 8″. Opposite the Western County Hotel, and 200 yards S.S.E. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 45	12 1	19 24·9	19 36·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 13	69 30·8	69 32·9
2	12 54	69 31·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 18	1·6955	1·6923

529. MILNTHORPE. August 18, 1890; R. and T. (70, 94). Lat. 54° 13′ 32″; Long. 2° 46′ 23″. In a field behind the Cross-Keys Hotel, and 50 yards to the W. of the Lancaster Road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 41	13 56	19 29·4	19 26·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 25	69 26·5	69 25·7
2	12 54	69 25·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27		
V	14 7	1·6995	1·7002

530. MINEHEAD. August 27, 1890; G. (60, 74). Lat. 51° 11′ 54″; Long. 3° 28′ 20″. In a field known as the "Green Ball," on Lower Upcote Farm, near the old road to Porlock.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 41	14 19	18 50·8	18 48·1
+3 30	15 59	18 50·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 36	67 41·0	67 40·2
2	15 1	67 40·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 36		
V	16 10	1·8113	1·8120

531. MONKSWOOD (USK). August 11, 1890; B. (61, 83). Lat. 51° 43′ 14″; Long. 2° 56′ 40″. In a field behind the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 48	11 30	18 56·5	18 54·7
+2 39	15 24	18 58·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 38	67 56·0	67 55·2
2	14 30	67 55·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 30		1·7935
V	11 54	1·7932	
V	15 42	1·7921	

532. MONMOUTH. August 9, 1890; B. (61, 83). Lat. 51° 48′ 27″; Long. 2° 42′ 47″. On Chippenham Mead, 100 yards E.S.E. of the Grand Stand. The Church bore N., and the Wye Railway Bridge 60° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 42			
+2 2	11 20	18 52·4	18 48·5
+2 30	15 31	18 49·9	
+2 35			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 43	68 0·1	67 57·7
2	14 19	67 56·6	
1	15 8	67 58·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 42		1·7910
V	11 50	1·7909	
V	15 48	1·7895	

533. MONTGOMERY. September 9, 1892; W. (70, 94). Lat. 52° 33′ 32″; Long. 3° 8′ 35″. 250 yards S.E. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 46	16 15	19 8·1	19 19·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 29	68 29·6	68 32·2
2	14 43	68 30·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 20		
V	15 43	1·7575	1·7539

534. MORETON HAMPSTEAD. July 23, 1890; G. (60, 74). Lat. 50° 39′ 23″; Long. 3° 46′ 15″. In a field, W. of the village, and on the S. side of the Prince Town Road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 13	11 36	18 54·8	18 51·8
+2 39	14 44	18 54·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 22	67 18·3	67 17·2
2	13 44	67 17·6	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	12 28		1·8400
V	11 50	1·8392	
V	14 32	1·8389	

535. Moreton-in-the-Marsh. August 19, 1892 ; R. (73, 99.) Lat. 51° 59′ 24″ ; Long. 1° 41′ 40″. On the cricket ground. About 200 yards from the Railway Station, which bore W. by N.

Declination.

Σ.	G.M.T.	δ.	δ$_0$.
h. m.	h. m.	° ′	° ′
+1 44	13 17	17 34·9	17 45·6
	15 6	17 35·3	

Inclination.

Needle.	G.M.T	θ.	θ$_0$.
	h. m.	° ′	° ′
1	14 31	68 4·3	68 6·3
2	14 48	68 4·0	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	15 35		
V	13 35	1·7809	1·7776

536. **Morpeth.** May 22, 1891; W. (70, 94). Lat. 55° 10′ 35″; Long. 1° 41′ 38″. On Cottingwood Common, to the N. of Mr. **Anderson's** house; Lunatic Asylum bearing E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 32	11 9	18 55·5	18 58·7
+2 23	14 58	18 55·8	
+4 0			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 6	69 52·2	69 52·1
2	13 32	69 51·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 40		
V	11 26	1·6699	1·6684
V	15 10	1·6682	

537. **Moseley.** September 11, 1890; B. (61, 83). Lat. 52° 26′ 44″; Long. 1° 53′ 40″. In the S.W. corner of Moseley Park. Moseley Hall bore 80° E. of N., and the Pavilion in the Football Ground 30° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 59	11 29	18 15·1	18 12·5
+3 21	15 49	18 13·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 0	68 14·7	68 13·7
2	14 38	68 13·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 50		1·7746
V	11 48	1·7752	
V	15 12	1·7728	

538. Mullion. August 6, 1890 : G. (60, 74). Lat. 50° 1′ 42″; Long. 5° 14′ 32″. In a field N.W. of the village, on the N. side of the road. Mullion Church bore 30° E. of S., about 350 yards distant. 100 yards from some stables, which bore 20° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 47	11 43	19 21·8	19 18·6
	14 43	19 20·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 13	67 20·6	67 20·0
2	13 37	67 21·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 25		1·8399
V	11 57	1·8406	
V	14 55	1·8373	

539. **Neath.** August 20, 1890; B. (61, 83). Lat. 51° 39′ 43″; Long. 3° 47 18″. In the grounds of Gnoll House, the residence of Evan Thomas, Esq. In the "Stable Field." About 100 yards E. of the stable and 100 yards N. of the bank of the reservoir. A small temple in the grounds bore S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 18	13 48	19 10·5	19 7·9
	17 20	19 10·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 25	67 57·8	67 56·5
2	16 50	67 56·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 44	1·7953	1·7960
V	14 8		

540. **Newark.** See "1890 Memoir," p. 175.

541. **Newbury.** September 10, 1890; G. (60, 74). Lat. 51° 24′ 12″; Long. 1° 19′ 40″. In the North Croft, about ½ mile W. of the town; 100 yards N. of the road across the Croft. A house at the W. end of the field bore due W., about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 18	10 15	17 42·6	17 41·4
+1 2	13 25	17 44·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 43	67 31·6	67 30·5
2	12 3	67 30·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 2		1·8284
V	10 30	1·8277	
V	13 36	1·8279	

542. NEWCASTLE. See "1890 Memoir," p. 176.

543. NEWPORT (Mon.). August 12, 1890; B. (61, 83). Lat. 51° 34′ 43″; Long. 3° 0′ 52″. In a field belonging to C. D. Phillips, Esq., about 1½ miles W. of the town, on the opposite side of the road to the Cemetery, and 150 yards from the Cardiff road. A line joining the Cemetery gateway and Gaer Fach Farmhouse passes through the station. The Cemetery gateway bore E.N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 12	11 47	18 53·9	18 50·3
+3 39	15 38	18 51·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 7	67 50·5	67 49·1
2	14 47	67 48·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 48		1·8029
V	12 12	1·8031	
V	15 23	1·8010	

544. Newport (Salop). August 31, 1892; W. (70, 94). Lat. 52° 45′ 31″; Long. 2° 22′ 0″. 30 yards E. of the road leading S. from the Railway Station, and about 300 yards from the station. Near a footpath through the fields.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +4 6	h. m. 16 26	° ′ 18 54·5	° ′ 19 5·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1	h. m. 16 5	° ′ 68 18·8	° ′ 68 20·8

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 16 36	1·7752	1·7718

545. Newport Pagnell. July 31, 1890; R. and T. (70, 94). Lat. 52° 4′ 51″; Long. 0° 43′ 47″. In a field near the Green, and to the S. of the Railway Station, which was 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 8	15 37	18 7·6	18 4·9
	17 14	18 7·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 3	68 4·6	68 4·1
2	16 37	68 4·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 52	1·7790	1·7798
V	15 56		

546. New Radnor. September 23, 1890; B. (61, 83). Lat. 52° 14′ 29″; Long. 3° 8′ 49″. In a field at the back of the school-house. Sir Charles Lewis's monument bore 60° W. of S., and was 200 yards away. The water tank at the Railway Station bore S.S.W., and a chapel on the hill N.N.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 22	14 51	19 16·3	19 13·7
+4 24	16 17	19 14·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 8	68 15·4	68 14·6
2	15 36	68 14·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 57	1·7754	1·7760
V	15 9	1·7755	
V	16 7		

547. **Newton-le-Willows.** September 26, 1891; W. (70, 94). Lat. 53° 27′ 38′; Long. 2° 37′ 3″. In a field to the W. of Rob Lane. The Glass Works bore 10° S. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 9	11 19	18 58·3	19 3·6

Inclination.

Needle.	G.M T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 22	68 57·6	68 57·8
2	12 47	68 55·8	

Horizontal Force

G.M.T.		H.	H_0.
	h. m.		
D	14 55		
V	11 37	1·7327	1·7304
V	14 10	1·7303	
V	14 26	1·7326	

548. **Newtown** (Montgomery). September 10 and 16, 1892; W. (70, 94). Lat. 52° 31′ 9″; Long. 3° 18′ 36″. In a field to the N. of a lane leading N.E. from the road to Llanllwchairn. About 500 yards E.N.E. of the bridge near the Post Office.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 10	+1 7	13 7	19 11·3	19 21·8
„ 16	−3 11	8 55	19 8·9	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 10	1	10 52	68 32·0	68 34·4
	2	11 12	68 32·3	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 10	V	11 54	1·7557	1·7521

549. NORTHAMPTON. See "1890 Memoir," p. 177.

550. NOTTINGHAM. See "1890 Memoir," p. 177.

551. OSWESTRY. September 25, 1890; B. (61, 83). Lat. 52° 51′ 11″; Long. 3° 4′ 12″. In a field belonging to Mr. DREW, on the S. side of the town waterworks reservoirs. Just beyond Broomhalls, and 70 yards S. of the road leading past the reservoirs to Llanfordisaf; 15 yards S. of an old oak tree.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 29	19 29·7	19 27·7
+1 30	13 56	19 29·9	
+4 26	16 18	19 28·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 48	68 37·2	68 35·7
2	14 39	68 34·6	
1	15 18	68 36·4	
2	15 42	68 36·1	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
D	12 25		
V	11 48	1·7489	1·7490
V	16 7	1·7481	

552. Oundle. September 14, 1892; G. (60, 74). Lat. 52° 29′ 8″; Long. 0° 28′ 58″. In a field W. of the town; 120 yards N. of the road to Benefield, &c.; about 500 yards W. of a bye-road running N. out of the main road. Church spire bore 15° S. of E., about $\frac{3}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ₀.
h. m.	h. m.	° ′	° ′
+2 23	14 31	17 23·4	17 34·3

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	14 59	67 53·8	67 56·5
83 1	15 10	67 55·2	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
V	14 40	1·7953	1·7921

553*a*. Oxford. See "1890 Memoir," p. 178.

553*b*. OXFORD. August 22, 1892; R. (73, 99). Lat. 51° 45′ 34″; Long. 1° 15′ 6″. In the Parks. The same Station as that at which observations were made in the 1886 survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 53	13 33	17 48·8	17 59·1
+3 39	15 35	17 48·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 36	67 51·4	67 53·5
2	15 0	67 51·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 26	1·7940	1·7907
V	13 45		

554. PANTYFFYNNON. May 19, 1892; W. (70, 94). Lat. 51° 46′ 35″; Long. 4° 0′ 16″. In a field to the W. of a road leading past Pantyffynnon Farm. About 100 yards E. of a cottage. The chimney of the Tin Works bore due E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
1 7	13 12	19 4·9	19 14·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 0	68 7·5	68 10·6
1	14 44	68 9·1	
2	14 17	68 9·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 35	1·7807	1·7782
V	15 56	1·7814	

555. **Pateley Bridge.** July 29, 1889; R. (60, 74). Lat. 54° 5′ 20″; Long. 1° 45′ 53″. Close to the river, and near the eastern corner of the grounds of Grassfield House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
1 38	11 2	18 52·6	18 42·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 56	69 22·8	69 19·9
2	13 16	69 20·2	

Horizontal Force.

G.M.T.		H.	H_0
	h. m.		
D	12 10	1·7044	1·7070
V	11 23	1·7038	

556. **Penrith.** August 23, 1890; R. and T. (70, 94). Lat. 54° 39′ 28″; Long. 2° 44′ 47″. In Trembles Nursery, to the S. of the town. The Castle ruins bore N.W., about $\frac{1}{4}$ mile distant, and the Parish Church bore N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 30	16 35	19 28·8	19 26·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 15	69 38·6	69 38·1

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 47	1·6795	1·6802

557. **Penwyllt.** May 16, 1892; W. (70, 94). Lat. 51° 49′ 35″; Long. 3° 40′ 0″. About 300 yards S.W. of the Railway Station, and 80 yards S.S.W. of a cottage.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 39	9 59	19 4·1	19 13·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 52	68 6·6	68 8·6
2	11 16	68 6·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 10	1·7866	1·7837

558. **Peterborough.** See "1890 Memoir," p. 179.

559. **Pickering.** August 16, 1892; G. (60, 74). Lat. 54° 14′ 32″; Long. 0° 46′ 30″. In the cricket-field on the S. side of the town; the E. corner of the field bore 5° S. of E., 50 yards distant; Church spire N. by E., about $\frac{1}{3}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 2	10 16	18 27·9	18 38·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 7	69 15·6	69 17·3
83 1	11 18	69 15·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	10 48		
V	10 26	1·7071	1·7040

560. **Plashetts.** May 20, 1891; W. (70, 94). Lat. 55° 12′ 5″; Long 2° 31′ 35″. About 350 yards due S. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 46	13 16	19 25·5	19 29·1
+3 56	16 31	19 27·3	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 0	69 56·1	69 56·0
2	11 30	69 54·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 18		1·6638
V	13 27	1·6656	
V	16 48	1·6634	

561. PLYMOUTH. See "1890 Memoir," p. 179.

562. POCKLINGTON. August 8, 1889; R. (60, 74). Lat. 53° 55′ 43″; Long. 0° 46′ 6″. In a field east of the Burnby Road, and about a $\frac{1}{4}$ mile east of the Vicarage.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+6 18	17 16	18 47·1	18 37·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 44	69 11·4	69 9·7
2	18 55	69 11·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 34	1·7071	1·7098

563. POINT OF AYRE (Isle of Man). August 19, 1892; W. (70, 94). Lat. 54° 24′ 19″; Long. 4° 21′ 41″. 30 yards W. of the road leading to the lighthouse, and 100 yards N. of the point where this road makes a slight bend to the N.W. Lighthouse bears 15° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 59	11 42	20 7·1	20 18·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 51	69 49·7	69 51·6
2	13 5	69 49·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		
V	11 53	1·6694	1·6660

564. PONTEFRACT. August 13, 1889; R. (60, 74). Lat. 53° 40′ 28″; Long. 1° 17′ 40″. In Mr. TEW's grounds.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 29	11 13	18 46·0	18 36·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	12 52	68 58·7	68 57·1

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 58	1·7210	1·7240
V	11 31	1·7217	

565. PONTRILAS. May 9, 1892; W. (70, 94). Lat. 51° 56′ 40″; Long. 2° 52′ 46″. In a field about 500 yards W. of the Railway Station, and about 200 yards to the north of the point where the two streams meet.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 34	10 58	19 0·6	19 9·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 8	68 0·9	68 2·2
2	13 24	68 0·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 7		1·7898
V	11 33	1·7931	
V	12 35	1·7920	

566. **Pontypool.** May 11, 1892; W. (70, 94). Lat. 51° 42′ 19″; Long. 3° 1′ 58″. In a field to the N.E. of the town, and to the N. of Pontypool Park. About 250 yards due N. of Pen-y-garn Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 39	10 53	18 43·7	18 52·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 20	67 56 6	67 58·3
2	12 36	67 56·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 41	1·7954	1·7926
V	11 9		

567. **Pontypridd.** August 16 and 18, 1890; B. (61, 83). Lat. 51° 36′ 12′; Long. 3° 19′ 42″. On the Common, about 60 yards W. of a stone bearing an inscription. The Church spire bore W.S.W.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Aug. 16	+1 46	14 38	18 54·5	18 50·9
„ 18	−1 47	11 1	18 53·0	
„ „	+2 4	14 3	18 52·3	

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Aug. 18	1	12 29	67 53·3	67 53·0
	2	13 9	67 54·0	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Aug. 16	D	13 28		
" "	V	15 3	1·7980	1·7981
" "	V	15 58	1·7955	
" 18	V	11 25	1·7956	
" "	V	13 46	1·8002	

568. PORT ERIN. See "1890 Memoir," p. 180.

569. PORTHALLOW. August 4, 1890; G. (60, 74). Lat. 50° 4′ 20″; Long. 5 4′ 53″. In a field just S. of Roskorwell Farm-house, on the E. side of the St. Kevern Road. 1st position, 50 yards N.N.W. of 2nd. The value of H found at the first station was alone used in calculating the Disturbing Forces.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
I.	+1 40	14 28	19 24·9	19 22·3
II.	+2 54	15 48	19 25·1	

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
I.	1	12 54	67 6·6	67 5·5
	2	13 20	67 6·0	

Horizontal Force.

G.M.T.			H.	H_0.
I.	V	h. m. 14 44	1·8461	1·8470
II.	V	16 2	1·8430	1·8439

570. **Portmadoc.** May 1, 1891; G. (60, 74). Lat. 52° 55′ 20″; Long. 4° 7′ 50″. On an open piece of ground between the two roads from Portmadoc to Borth. The latter bore 20° W. of S., and was about $\frac{1}{3}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 24	h. m. 13 53	° ′ 19 20·4	° ′ 19 24·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1	h. m. 12 45	° ′ 68 46·7	° ′ 68 47·2

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 14 4	1·7509	1·7493
V	14 20	1·7490	

571. **Preston.** See "1890 Memoir," p. 181.

572. **Purfleet.** See "1890 Memoir," p. 181.

573. **Pwllheli.** See "1890 Memoir," p. 182.

574. Radstock. September 5, 1890; G. (60, 74). Lat. 51° 18′ 12″; Long. 2° 28′ 30″. In a field to the W. of Clan Down, about 120 yards E. of a bye-road running S. into Midsomer Norton.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 3	11 32	18 28·6	18 26·0
+2 18	14 47	18 27·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 52	67 35·1	67 35·0
2	13 12	67 35·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 16		1·8148
V	11 50	1·8140	
V	14 59	1·8145	

575. Ramsey (Hunts). September 16, 1892; G. (60, 74). Lat. 52° 26′ 50″; Long. 0° 6′ 50″. In a field about ½ mile W. of the village, 80 yards W. of a sharp bend in a bye-road running N.W., which turns out of the high road to Huntingdon at a point near the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 6	11 0	17 18·4	17 29·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 51	68 3·5	68 5·4
83 1	12 0	68 3·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 28	1·7813	1·7791
V	11 10		

576. **Ramsey** (Isle of Man). See "1890 Memoir," p. 183.

577. **Ranmore.** See "1890 Memoir," p. 183.

578. **Ravenglass.** September 10, 1891; W. (70, 94). Lat. 54° 21′ 30″; Long. 3° 25′ 40″. In a field to the W. of Saltcoats; railway station bearing E., and Drigg Church, N.N.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 9	11 26	19 45·1	19 50·8
+1 47	14 21	19 46·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m	° ′	° ′
1	13 10	69 35·3	69 36·7
2	13 34	69 36·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 29		
V	11 58	1·6903	
V	14 32	1·6874	1·6868
V	14 46	1·6865	

579*a* and *b*. Reading. See "1890 Memoir," p. 184.

580*a* and *b*. Redcar. See "1890 Memoir," p. 185.

581. Retford. October 1, 1890; G. (60, 74). Lat. 53° 19′ 58″; Long. 0° 57′ 0″. In a field E. of a bye-road leading to Lound. A little S. of the rifle ranges. East Retford Church tower bore 30° E. of S., about 1 mile distant. The shaft of Bollom Paper-mill bore 10° N. of E., about $\frac{1}{3}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 43	h. m. 14 59	° ′ 18 13·2	° ′ 18 11·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m	° ′	° ′
1	13 6	68 42·1	68 41·6
2	13 25	68 42·0	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 15 12	1·7455	1·7460

582. **Rhayader.** April 21, 1891; G. (60, 74). Lat. 52° 17′ 57″; Long. 3° 30′ 31″. In a field on the W. side of the road which runs S.E. out of Rhayader, about 200 yards from the Market.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 12	13 35	19 6·8	19 8·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 23	68 25·3	68 26·3
2	12 46	68 26·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 16	1·7623	1·7617
V	10 45		

583. **Rhyl.** September 29, 1890; B. (61, 83). Lat. 53° 19′ 33″; Long. 3° 29′ 12″. On the sand-hills to the E. of the town; and 300 yards N.E. of the Alexandra Hospital. St. Thomas's Church bore 10° W. of S., and the Pier head 50° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 32	11 3	19 42·5	19 41·4
+3 1	14 49	19 43·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 25	68 57·9	68 57·1
2	14 1	68 57·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8		1·7253
V	11 33	1·7245	
V	14 36	1·7251	

584. Richmond (Yorkshire). July 19, 1889; R. and R. (60, 74). Lat. 54° 24′ 29″; Long. 1° 44′ 0″. In a field to the west of the road which leads from the town to the east end of the Race Course.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 21	11 20	18 58·8	18 47·4
	12 39	18 55·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 29	69 34·2	69 31·5
2	11 14	69 31·1	
1	12 5	69 34·3	
2	12 54	69 32·0	
2	13 28	69 32·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8	1·6854	1·6879
V	11 40	1·6847	

585. **Riverhead** (Sevenoaks). July 1, 1890; T. and G. (60, 74). Lat. 51° 16′ 57″; Long. 0° 10′ 5″ E. On Riverhead Green, near the centre. Riverhead Church bore due E., the Rock Hotel N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 52	11 32	17 16·2	17 13·2
+3 2	14 43	17 16·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 4	67 10·3	67 10·0
2	14 24	67 11·9	
1	15 3	67 10·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 42		
V	11 50	1·8374	1·8397
V	12 5	1·8395	
V	12 22	1·8394	

586. **Rochdale.** September 19, 1891; W. (70, 94). Lat. 53° 37′ 9″; Long. 2° 11′ 13″. About 200 yards N.W. of Greave Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 58	11 46	18 29·3	18 34·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 1	69 7·5	69 8·1
2	14 26	69 6·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 18		
V	12 33	1·7190	1·7175
V	12 48	1·7187	

587. ROCKINGHAM. September 14, 1892; G. (60, 74). Lat. 52° 30′ 50″; Long. 0° 43′ 10″. In a field to the E. of the village; 30 yards N. of the road to Corby and Weldon. Lodge near the Church, at the entrance to the Castle Grounds, bore 30° S. of W., about 60 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 6	11 3	17 51·6	18 2·5

Inclination.

Needle.	G.M T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 55	68 1·8	68 4·6
83 1	12 6	68 3·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 31		
V	11 13	1·7830	1·7798

588*a*. Ross. See "1890 Memoir," p. 232.

588*b*. Ross. May 7, 1892; W. (70, 94). Lat. 51° 54′ 58″; Long. 2° 36′ 13″. To the east of the town and of the river. About 300 yards north of Wilton Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 36	10 55	18 25·7	18 34·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 19	68 1·9	68 3·5
2	12 35	68 1·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 14	1·7885	1·7858

589. Rushbury. September 8, 1892; W. (70, 94). Lat. 52° 31′ 5″; Long. 2° 42′ 24″. 300 yards E. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 35	13 31	18 36·7	18 48·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 59	68 26·2	68 28·3
2	13 12	68 26·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 57		
V	14 31	1·7620	1·7586

590. Ruthin. April 24, 1891; G. (60, 74). Lat. 53° 7′ 4″; Long. 3° 18′ 41″. In a field on the N. side of the town, about 200 yards N.W. of the Cemetery. Spire of Ruthin Church bears 36° E. of S., about 350 yards distant. Railway about 300 yards E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 29	11 5	19 26·5	19 29·8
+1 22	13 56	19 28·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 22	68 53·4	68 53·8
2	12 43	68 53·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 45		1·7322
V	11 21	1·7336	
V	14 10	1·7321	

591. Ryde. See "1890 Memoir," p. 185.

592. St. Cyres. See "1890 Memoir," p. 186.

593*a*. St. Leonard's. See "1890 Memoir," p. 187.

593*b*. St. Leonards. May 7, 1892; R. (73, 99). Lat. 50° 50′ 56″; Long. 0° 31′ 5″ E. About 100 yards E. of the station at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 51	14 23	16 46·8	16 55·3
+4 39	16 17	16 47·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 31	66 52·0	66 53·7
2	15 56	66 52·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 10		
V	14 43	1·8541	1·8514

594. St. Levan. August 8, 1890; G. (60, 74). Lat. 50° 2′ 50″; Long. 5° 39′ 17″. On some rough open land near the Cable Station, which bore 7° W. of S., about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 34	11 30	19 43·1	19 38·8
+2 39	14 54	19 40·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 1	67 10·2	67 8·5
2	13 30	67 8·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 14		
V	11 44	1·8454	1·8434
V	14 39	1·8396	

595. ST. NEOTS. September 27, 1890; G. (60, 74). Lat. 52° 12′ 57″; Long. 0° 16′ 10″. Near the S.W. corner of a field W. of the Biggleswade Road, and about 200 yards from it; the gate of the field was about 400 yards past the turning to Potton. A farmhouse bore 40° W. of N., about 400 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 13	11 23	17 37·5	17 36·1
+2 14	14 35	17 38·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 49	67 59·5	67 58·8
2	13 11	67 59·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 9		
V	11 36	1·7852	1·7846
V	14 45	1·7831	

596*a*. Salisbury. See "1890 Memoir," p. 187.

596*b*. Salisbury. April 27, 1892; W. (70, 94). Lat. 51° 5′ 3″; Long. 1° 48′ 6″. The same station as that at which observations were made in the 1886 survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 11	11 19	17 41·8	17 50·5

Inclination.

Need'e.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 45	67 18·8	67 20·6
2	13 5	67 18·9	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 11 27	1·8317	1·8289

597. Salisbury Plain. September 8, 1890; G. (60, 74). Lat. 51° 10′ 54″; Long. 1° 49′ 45″. On the Plain, about 300 yards from Stonehenge, which bore 40° E. of S. Chimney-stack on a farmhouse bore 50° W. of S., about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 28	14 52	17 55·3	17 53·1
+3 28	15 21	17 55·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 36	67 25·8	67 24·8
2	13 55	67 24·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 58		
V	12 32	1·8262	1·8263
V	15 9	1·8251	

598. Salkeld, Great. August 4, 1892; G. (60, 74). Lat. 54° 43′ 14″; Long. 2° 42′ 0″. In a field on the S. side of the road running W. from the village; about 200 yards from its junction with the main street.

Declination.

Σ.	G.M.T.	δ.	δ_0
h. m.	h. m.	° ′	° ′
+0 59	13 27	19 25·4	19 36·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 1	69 37·9	69 40·4
83 1	13 11	69 39·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 39	1·6820	1·6788

599. **Santon** (Isle of Man). August 22, 1892; W. (70, 94). Lat. 54° 7′ 12″; Long. 4° 35′ 9″. 100 yards N.W. of a cottage on the W. side of the road leading N. from the station, and about 150 yards from the bridge over the railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 49	14 24	19 57·0	20 8·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 1	69 37·5	69 39·7
2	15 16	69 38·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 56	1·6866	1·6832
V	13 28		

600. **Saxmundham.** September 12, 1892; G. (60, 74). Lat. 52° 12′ 45″; Long. 1° 29′ 46″ E. In a field N.E. of the village; 150 yards E. of the road to Yoxford, &c., and about 100 yards S. of the Railway. 60 yards E. of a small river, and 30 yards S. of a cart-track leading to a farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 56	13 55	16 36·5	16 46·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 26	67 42·7	67 45·0
83 1	14 37	67 43·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 5	1·8027	1·7997

601. Scarborough. See "1890 Memoir," p. 188.

602. Sedbergh. August 27, 1890; R. and T. (70, 94). Lat. 54° 19′ 17″; Long. 2° 31′ 40″. Near the centre of the Grammar School Cricket Ground.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 1	10 46	19 30·1	19 27·0
+0 35	12 36	19 28·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	. m.	° ′	° ′
1	10 33	69 33·9	69 33·4
2	11 0	69 33·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 51		
V	10 59	1·6891	
V	11 14	1·6896	1·6900

603. **Sedgefield.** August 9, 1892; G. (60, 74). Lat. 54° 39′ 5″; Long. 1° 29′ 22″. In a field on the W. side of the Railway; the Station bore 30° E. of S., about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 42	12 27	18 39·0	18 49·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 7	69 34·4	69 36·7
83 1	13 16	69 35·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 35	1·6830	1·6798
V	12 37		

604. **Selby.** August 12, 1889. R. (60, 74). Lat. 53° 46′ 49″; Long. 1° 5′ 4″. Between the road which leads W. from the town and Selby Dam.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 24	11 3	18 28·8	18 19·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 0	69 3·4	69 1·1
2	12 24	69 2·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 53	1·7211	1·7235
V	11 29	1·7206	

605. **Shap.** August 25, 1890 ; R. and T. (70, 94). Lat. 54° 31′ 12″ ; Long. 2° 40′ 15″. In a field near the Greyhound Hotel, and on the W. side of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 23	15 24	19 37·6	19 34·9
+2 47			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 28	69 38·9	69 38·0
2	16 54	69 38·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 37	1·6793	1·6800

606. **Sheerness.** April 29, 1891 ; W. (70, 94). Lat. 51° 25′ 25″ ; Long. 0° 47′ 0″ E. In a field near the "Half-way Houses" ; the Minster Church bearing E., the Cemetery S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 20	12 52	16 54·9	16 57·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	11 30	67 19·3	67 19·4
2	12 2	67 18·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 44		
V	13 10	1·8308	1·8302

607. SHEFFIELD. October 4, 1890; G. (60, 74). Lat. 53° 21′ 55″; Long. 1° 26′ 42″. In a field on the E. side of Norfolk Park; the gate by Arbourthorn Lodge, at the S.E. corner of the Park, bore 40° W. of S., about 100 yards distant. A Cemetery Chapel bore 50° E. of N., about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° '	° '
+2 15	11 30	18 54·8	18 53·5
	14 42	18 55·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1	12 42	68 46·1	68 45·6
2	12 59	68 46·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8		
V	11 43	1·7386	1·7391

608. SHIFNAL. September 9, 1890; B. (61, 83). Lat. 52° 39′ 40″; Long. 2° 22′ 7″. In the first field on the left after leaving the houses in Wolverhampton Road. Park House bore 25° W. of N., the railway arch 40° E. of N., and Upton Windmill S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 34	11 3	18 40·8	18 39·1
+2 36	14 28	18 41·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 4	68 24·9	68 23·8
2	13 38	68 23·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 57		
V	11 25	1·7627	1·7627
V	14 8	1·7614	

609. SHOREHAM (Kent). July 19, 1890; B. (61, 83). Lat. 51° 20′ 8″; Long. 0° 10′ 54″ E. In a field on the E. bank of the Darent. Half-way between Wilmott's Paper Mill and the stile on the footpath leading to the mill.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 31	11 8	17 16·9	17 13·5
	16 7	17 15·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 56	67 14·0	67 13·1
2	14 46	67 13·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 35		
V	11 34	1·8377	1·8381
V	16 26	1·8367	

610. **Shrewsbury.** See "1890 Memoir," p. 189.

611. **Sidmouth.** July 22, 1890; G. (60, 74). Lat. 50° 40′ 28″; Long. 3° 14′ 42″. In a meadow W. of the town, between the Otterton Road and the sea, near the edge of the cliffs. The flag-staff on Sea View House, by the wooden steps leading down to the beach, bore 16° N. of E., 120 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 21	11 31	18 43·2	18 39·4
+1 23	13 29	18 41·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 16	67 13·3	67 13·6
2	15 41	67 15·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 21		
V	11 44	1·8385	1·8393
V	13 13	1·8382	

612. SILLOTH. August 6, 1892; W. (70, 94). Lat. 54° 52′ 14″; Long. 3° 22′ 51″. About 500 yards N.E. of the Parade. 80 yards S. of the road to Silloth House and half way between two farm-houses.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 57	10 15	19 41·9	19 53·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 1	69 50·7	69 52·8
2	12 18	69 51·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 18		
V	10 42	1·6694	1·6662

613. SITTINGBOURNE. June 27, 1890; G. (60, 74). Lat. 51° 20′ 17″; Long. 0° 44′ 18″ E. In a meadow behind the Bull Hotel, and close to the Cattle Market. Church-tower bore N.E., about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 50	10 39	16 57·3	16 53·7
+1 47	13 34	16 56·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 14	67 12·8	67 11·8
2	12 38	67 12·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 23		1·8361
V	10 52	1·8351	
V	13 21	1·8351	

614. Skipton. July 27, 1889; R. and R. (60, 74). Lat. 53° 56′ 50″; Long. 2° 1′ 22″. About a mile S. of the town. In a field on the E. side of the Cononley Road, about 100 yards N. of Carlton Bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 26	11 23	18 54·1	18 44·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 59	69 16·9	69 15·2
2	11 7	69 17·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 20	1·7059	1·7092
V	11 50.	1·7067	

615. SLEAFORD. September 30, 1890; G. (60, 74). Lat. 53° 0′ 55″; Long. 0° 25′ 18″. In a field 200 yards E. of the main road to Lincoln, about 1½ miles N.N.W. of the town. Some farm buildings bore S.W., about 350 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 44	14 14	17 33·8	17 32·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 26	68 30·2	68 29·7
2	12 46	68 30·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 48		
V	11 21	1·7561	1·7566

616. SNODLAND. July 18, 1890; B. (61, 83). Lat. 51° 19′ 50″; Long. 0° 26′ 2″ E. In a field near Cox's Farm, and ¾ mile W. of the Railway Station, 60 yards S. of the road, and 60 yards from the farm-house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 59	11 35	17 6·6	17 4·3
+3 37	14 52	17 7·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 38	67 13·2	67 12·6
2	14 18	67 13·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 32		1·8385
V	11 52	1·8374	
V	15 11	1·8378	

617. Southampton. July 7, 1890; G. (60, 74). Lat. 50° 55′ 49″; Long. 1° 23′ 40″. In a meadow adjoining Highfield Rectory, 120 yards from the house. The Church-spire bore S.E., about 400 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 4	10 49	17 45·0	17 41·7
	13 48	17 44·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 20	67 9·9	67 10·0
2	12 46	67 11·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 30		1·8404
V	11 3	1·8403	
V	13 38	1·8387	

618. SOUTHEND. See "1890 Memoir," p. 189.

619. SOUTHPORT. September 24, 1891; W. (70, 94). Lat. 53° 39′ 17″; Long. 2° 57′ 28″. In a field to the N. of Moss Lane, opposite Pool House Farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 35	14 0	19 14·9	19 20·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 49	69 9·0	69 10·9
2	16 13	69 10·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 6		1·7156
V	14 40	1·7169	
V	14 26	1·7171	

620*a*. SPALDING. See "1890 Memoir," p. 190.

620*b*. SPALDING. August 31, 1892; G. (60, 74). Lat. 52° 47′ 5″; Long. 0° 8′ 48″. On the side-lawn in the grounds of Holyrood House, the residence of — HOWARD, Esq., J.P., 70 yards W. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 32	10 43	17 9·1	17 19·9

Inclination.

Needle.	G.M.T.	θ.	θ$_0$.
	h. m.	° ′	° ′
1	11 49	68 11·1	68 12·5
83 1	12 2	68 9·8	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	11 18		
V	10 58	1·7770	1·7738

621. Spilsby. August 23, 1889; R. (60, 74). Lat. 53° 10′ 28″; Long. 0° 5′ 59″ E. In a field about a quarter of a mile N.W. of the cross-roads in the centre of the town.

Declination.

Σ.	G.M.T.	δ.	δ$_0$.
h. m.	h. m.	° ′	° ′
−2 32	10 14	18 0·8	17 52·9
	12 13	18 2·3	

Inclination.

Needle.	G.M.T.	θ.	θ$_0$.
	h. m.	° ′	° ′
1	11 7	68 32·9	68 30·7
2	11 27	68 31·7	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	11 55	1·7530	1·7563
V	10 37	1·7546	

622. **Stafford.** May 11, 1892; G. (60, 74). Lat. 52° 49′ 35″; Long. 2° 7′ 5″. On the "Common Fields" N. of the town, 100 yards W. of the Marston Road, and about $\frac{3}{4}$ mile N. of the Common Station. Portfields Farm bore 10° E. of S., about $\frac{1}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 30	11 1	18 27·8	18 37·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 1	68 28·6	68 29·7
2	11 48	68 27·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 13	1·7548	1·7520

623. **Stalbridge.** July 14, 1890; G. (60, 74). Lat. 50° 57′ 35″; Long. 2° 22′ 54″. In Stalbridge Park, about 120 yards from the Church, and 20 yards E. of the road leading up to the farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 30	11 11	18 21·3	18 18·2
	15 10	18 21·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 54	67 19·5	67 19·5
2	13 22	67 21·2	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	14 2		
V	11 26	1·8309	1·8318
V	14 59	1·8308	

624. **Stamford.** September 29, 1890; G. (60, 74). Lat. 52° 39′ 20″; Long. 0° 29′ 20.″ In a field close to the town, E. of the Cemetery. All Saints' Church-spire bore 43° E. of S., about ½ mile distant. Spire of the Cemetery Chapel 20° N. of W., about 300 yards distant. A little N. of the Cemetery Road.

Declination.

Σ.	G.M.T.	δ.	δ$_0$.
h. m.	h. m.	° ′	° ′
+1 37	14 0	18 8·2	18 6·6

Inclination.

Needle.	G.M.T.	θ.	θ$_0$.
	h. m.	° ′	° ′
1	14 41	68 16·9	68 15·4
2	15 2	68 14·8	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
V	14 11	1·7652	1·7657

625. **Stanmore.** July 28, 1890; R. and T. (70, 94). Lat. 51° 36′ 54″; Long. 0° 18′ 35″.

Declination.

Σ.	G.M.T.	δ.	δ$_0$.
h. m.	h. m.	° ′	° ′
+2 7	14 42	17 39·8	17 36·8
+4 16	16 5	17 39·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 21	67 30·3	67 29·7
2	14 43	67 30·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 38	1·8159	1·8167
V	15 4		

626. STOCKTON-ON-TEES. August 10, 1892; G. (60, 74). Lat. 54° 34′ 22″; Long. 1° 19′ 30.″ In a field W. of the road to Thorpe Thewles; about 600 yards N.E. of the Railway Station (North Stockton), 10 yards from the road, and $\frac{1}{4}$ mile E. of Newham Grange.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 46	10 40	18 31·9	18 42·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 36	69 29·8	69 32·8
83 1	11 46	69 32·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 12	1·6900	1·6868
V	10 52		

627. STOKE-ON-TRENT. See "1890 Memoir," p. 191.

628. STOKESLEY. October 2, 1891; W. (70, 94). Lat. 54° 27′ 55″; Long. 1° 11′ 22″. About 350 yards S.S.E. of the Flour Mills; Church bearing 10° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 37	12 57	18 37·7	18 42·3
+1 16	13 34	18 36·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 18	69 26·3	69 27·7
2	14 40	69 27·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 25	1·6949	1·6936

629*a*. STONYHURST. See "1890 Memoir," p. 256.

629*b*. STONYHURST. August 14, 1890; R. and T. (70, 94). Lat. 53° 50′ 40″; Long. 2° 28′ 10″. In the Magnetic Observatory.

Declination.

G.M.T.	δ.	δ_0.
h. m.	° ′	° ′
11 34	19 4·8	19 2·8
16 5	19 6·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 24	69 9·5	69 9·6
2	14 56	69 10·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 46		1·7130
V	11 50	1·7128	
V	12 10	1·7116	
D	15 27		
V	15 52	1·7124	

630. STRATFORD-ON-AVON. August 17, 1892; R. (73, 99). Lat. 52° 11′ 41″; Long. 1° 41′ 55″. In a field 100 yards to the E. of the Warwick Road. The Roman Catholic Church bore N.N.W., and was about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 30	16 10	17 26·4	17 36·3
	18 5	17 24·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 9	68 7·7	68 9·7
2	17 26	68 7·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 29		1·7797
V	17 45	1·7842	
V	18 46	1·7819	

631. Strood. April 30, 1891; W. (70, 94). Lat. 51° 24′ 5″; Long. 0° 29′ 40″ E. In a field belonging to Mr. Heath, and N. of his house; windmills bearing N.N.E.; Rochester Castle S.S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 26	13 54	17 3·1	17 5·5
+4 43	15 39	17 3·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 18	67 17·5	67 17·4
2	12 43	67 16·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 59		1·8333
V	14 9	1·8344	
V	15 52	1·8332	

632. Stroud. August 7, 1890; B. (61, 83). Lat. 51° 43′ 50″; Long. 2° 13′ 12″. On Rodborough Common, 300 yards due S. of Rodborough Fort.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 59	14 7	18 24·9	18 22·8
+6 15	18 16	18 26·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 32	67 56·0	67 54·0
2	17 3	67 53·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 30		1·7965
V	14 30	1·7968	
V	14 50	1·7953	
V	18 3	1·7952	
V	18 48	1·7955	

633. SUNDERLAND. May 13, 1891; W. (70, 94). Lat. 54° 53′ 30″; Long. 1° 24′ 40″. In a field near the road to Houghton, immediately to the N. of Humbleton Hill, Low Barnes House bearing N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 20	11 16	18 37·7	18 40·1
+4 6			

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 48	69 37·4	69 37·9
2	15 26	69 37·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 39	1·6836	1·6830

634. SUTTON BRIDGE. See "1890 Memoir," p. 191.

635. SUTTON-ON-DERWENT. August 8, 1889; R. (60, 74). Lat. 53° 54′ 53″; Long. 0° 55′ 25″. In a field immediately behind the Inn.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 40	14 5	18 43·4	18 33·9
	14 41	18 42·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 24	69 12·9	69 10·0
2	13 41	69 10·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 25	1·7112	1·7139

636. SWANLEY JUNCTION. June 25, 1890; G. (60, 74). Lat. 51° 22′ 44″; Long. 0° 10′ 43″ E. In a field on Lackland's Farm, about 1 mile S.E. of the Junction. The hood of a malting-house, $\frac{1}{4}$ mile distant, bore N.N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 3	11 24	17 16·6	17 13·5
	14 31	17 16·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 6	67 17·0	67 16·3
2	13 32	67 17·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 11		1·8355
V	11 38	1·8360	
V	14 46	1·8330	

637*a*. SWANSEA. See "1890 Memoir," p. 192.

637*b*. SWANSEA. May 17, 1892; W. (70, 94). Lat. 51° 37′ 14″; Long. 3° 58′ 8″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 8	11 26	18 56·3	19 5·1
+1 32	14 8	18 54·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 41	67 50·3	67 53·3
1	13 27	67 52·4	
2	13 0	67 51·6	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	14 42		
V	11 42	1·8067	1·8035
V	14 19	1·8062	

638. Swindon (1). See "1890 Memoir," p. 193.

639. Swindon (2). April 29, 1892; W. (70, 94). Lat. 51° 33′ 10″; Long. 1° 47′ 50″. In a field to the west of the town and to the east of the canal. About 250 yards N.W. of the farm marked "Okus" in the Ordnance Map.

Declination.

Σ.	G.M.T.	δ.	δ$_0$.
h. m.	h. m.	° ′	° ′
−1 28	11 3	17 33·6	17 42·3

Inclination.

Needle.	G.M.T.	θ.	θ$_0$.
	h. m.	° ′	° ′
1	12 25	67 44·4	67 46·1
2	12 39	67 44·4	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	11 50		
V	11 19	1·8106	1·8068
V	13 26	1·8085	

640. SYSTON. April 27, 1892; G. (60, 74). Lat. 52° 42′ 16″; Long. 1° 4′ 50″. In a field between the two Railways, N. of Syston Junction. On the E. side of the road, and about ¼ mile N. of the point where it passes under the Midland Railway. Syston Church Tower bore S.E., about ⅓ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 56	11 26	17 35·2	17 44·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 25	68 21·0	68 22·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 46		
V	11 41	1·7677	1·7652

641. TAMWORTH. August 7, 1890; R. and T. (70, 94). Lat. 52° 37′ 52″; Long. 1° 42′ 1″. In a field bounded by, and S. of the River Tame. 100 yards W. of the Lady Bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	11 19	18 36·5	18 36·2
+0 27	12 25	18 41·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 56	68 28·1	68 27·4
2	11 31	68 27·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 3		
V	11 31	1·7545	1·7553

642. TAUNTON. See "1890 Memoir," p. 193.

643. TAVISTOCK. August 12, 1890; G. (60, 74). Lat. 50° 31′ 13″; Long. 4° 7′ 16″. In a field about 2½ miles S.S.E. of the town, between the New and the Old Roads to Plymouth.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 25	19 4·1	19 1·0
+2 33	14 45	19 3·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 57	67 12·0	67 12·3
2	13 24	67 14·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 10		
V	11 42	1·8425	1·8429
V	14 32	1·8416	

644. TERLING (Witham). September 19, 1892; G. (60, 74). Lat. 51° 47′ 38″; Long. 0° 33′ 50″ E. On Lord Rayleigh's estate. The gate opening from the road bore 55° E. of S., about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 0	16 31	17 5·1	17 15·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 7	67 34·5	67 36·3
83 1	16 18	67 33·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 3		
V	16 40	1·8132	1·8097

645. TETBURY. May 3, 1892; W. (70, 94). Lat. 51° 39′ 3″; Long. 2° 10′ 17″. In a field to the north of the village. About 200 yards W. of Upton Grove.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 27	14 52	18 15·5	18 24·3
	14 59	18 15·4	

Inclination.

Needle.	G.M.T	θ.	θ_0.
	h. m.	° ′	° ′
1	13 21	67 48·7	67 50·9
2	13 47	67 49·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 4		
V	12 36	1·8030	1·8002

646. **Tewkesbury.** August 15, 1892; R (73, 99). Lat. 51° 59′ 24″; Long. 2° 10′ 0″. On the Ham Common, about 200 yards W. of the Avon. The Tower of the Abbey bore E. by S. ½ E.; some mills marked on the Ordnance Map E. by N., and the bridge over the Severn N. ½ E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 2	15 38	18 24·8	18 35·0
+5 42	17 36	18 23·7	
+6 12	18 9	18 24·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 43	68 3·9	68 5·6
2	17 1	68 3·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 55	1·7866	1·7825
V	17 20	1·7849	

647. **Thetford.** See "1890 Memoir," p. 194.

648. **Thirsk.** See "1890 Memoir," p. 195.

649. **Thorne.** August 15, 1889; R. (60, 74). Lat. 53° 37′ 4″; Long. 0° 57′ 30″. On the W. side of a road which runs N.E. from the town, about 100 yards S.W. of the point where Lands End Lane runs into it.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 47	17 4	18 21·1	18 11·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 57	69 0·1	68 57·2
2	18 14	68 57·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V.	17 24	1·7259	1·7285

650. **Tilney.** See "1890 Memoir," p. 195.

651. **Tintern.** See "1890 Memoir," p. 232.

652. Tiverton. August 22, 1890; G. (60, 74). Lat. 50° 55′ 24″; Long. 3° 28′ 55″. About 1½ miles N.N.E. of the town, in a field on the W. side of the longer road to Bampton; about 150 yards N. of a round pond.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 19	11 36	18 57·3	18 55·8
+1 47	14 30	18 59·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 7	67 27·4	67 26·5
2	13 30	67 26·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 20		1·8259
V	11 51	1·8254	
V	14 43	1·8250	

653. Towcester. August 1, 1890; R. and T. (70, 94). Lat. 52° 7′ 55″; Long. 0° 59′ 28″. On the N. side of the Brockley Road, and 50 yards from the road. St. Lawrence's Church bore due W. and Norton Church W.N.W. ½ N. The Grammar School bore S.W., and was 70 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 22	14 50	18 15·1	18 11·9
+4 26	16 21	18 14·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 30	68 4·4	68 3·1
2	14 53	68 3·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 59		1·7828
V	15 7	1·7822	
V	15 32	1·7818	

654. TREGARON. August 30, 1890; B. (61, 83). Lat. 52° 13′ 2″; Long. 3° 55′ 49″. Fifty yards E. of a little knoll on the hill overlooking the town. The Church bore 10° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 46	11 3	19 16·1	19 15·1
+3 31	15 30	19 18·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 31	68 23·3	68 21·7
2	14 12	68 21·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 28		1·7658
V	11 41	1·7659	
V	15 6	1·7642	

655. Tring. July 29, 1890; R. and T. (70, 94). Lat. 51° 47′ 41″; Long. 0° 38′ 2″. In the grounds of Pendley Manor, the residence of S. G. Williams, Esq. The house was about 300 yards N.W. by W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 31	16 8	18 0·6	17 57·4
+4 51	16 42	17 59·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 48	67 47·5	67 46·8
2	16 7	67 47·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 29	1·8011	1·8019

656. Truro. August 1, 1890; G. (60, 74). Lat. 50° 15′ 22″; Long. 5° 2′ 15″. In a cricket field S.E. of the town, on Lambessow Farm; the Pavilion bore 5° S. of W., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 35	11 16	19 26·5	19 22·6
+3 39	14 30	19 26·2	
	15 51	19 24·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 26	67 14·7	67 13·1
2	15 3	67 13·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 6		1·8425
V	11 36	1·8419	
V	14 43	1·8412	

657*a*. TUNBRIDGE WELLS. See "1890 Memoir," p. 196.

657*b*. TUNBRIDGE WELLS. April 30, 1892; R. (73, 99). Lat. 51° 7′ 36″; Long. 0° 15′ 37″ E. On the Common; about 100 yards 20° W. of S. of the cedars.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 18	13 47	16 56·2	17 4·8
+5 3	16 33	16 57·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 58	67 5·8	67 7·0
2	16 20	67 4·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 59		
V	14 7	1·8424	1·8397

658. ULLESTHORPE. April 28, 1892; G. (60, 74). Lat. 52° 29′ 5″; Long. 1° 15′ 35.″ In a field W. of the village and S. of the road to Hinckley; about 80 yards past the turning leading to the Railway Station. "The College" bore N.E., about 120 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 58	h. m. 11 15	° ′ 18 8·2	° ′ 18 16·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 15	68 14·4	68 16·4
1	13 33	68 15·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 54	1·7682	1·7655
V	11 29		

659. ULVERSTON. August 16 and 17, 1892; W. (70, 94). Lat. 54° 12′ 15″; Long. 3° 6′ 10″. To the N.W. of the town; 200 yards S.S.E. of Old Hall Farm, and 100 yards W. of the road.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
August 17	h. m. −3 4	h. m. 9 26	° ′ 19 14·8	° ′ 19 26·2

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
August 16	1 2	10 57 11 11	69 31·7 69 31·5	69 33·5

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
August 16	D V	12 45 12 11	1·6940	1·6908

660. UTTOXETER. May 12, 1892; G. (60, 74). Lat. 52° 53′ 55″; Long. 1° 52′ 43″. In a field W. of the lane which turns S. out of the road to Bramshall. About ½ mile W. of Uttoxeter. 200 yards N. of the Railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	10 56	18 31·2	18 40·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2 1	12 1 12 13	68 27·0 68 28·6	68 29·4

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	11 31 11 8	1·7575	1·7547

661. Ventnor. July 3, 1890; G. (60, 74). Lat. 50° 35′ 47″; Long. 1° 12′ 44″. In a meadow opposite the Cemetery, on the main road to Newport; the Cemetery-gate bore W., about 120 yards distant. The Dip observations were made 40 yards S.S.E. of the others.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 14	11 22	17 39·2	17 35·0
+2 19	14 53	17 37·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 41	66 58·5	66 58·2
2	14 3	66 59·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 40	1·8530	1·8539
V	11 55		

662. Wadebridge. August 11, 1890; G. (60, 74). Lat. 50° 30′ 50″. Long. 4° 51′ 12″. In a field due N. of St. Breock village, about 200 yards from Lobb's Farm, which bore due S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 28	11 27	19 20·9	19 18·4
+1 59	14 10	19 21·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 22	67 18·1	67 16·6
2	12 43	67 16·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 17		
V	11 44	1·8385	1·8395
V	13 57	1·8387	

663. WAINFLEET. August 23, 1889; R. (60, 74). Lat. 53° 6′ 35″; Long. 0° 13′ 56″ E. About ½ mile E. of the town and ¼ mile from the railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 59	16 14	17 43·2	17 34·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 12	68 29·5	68 27·0
2	17 28	68 27·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 35	1·7571	1·7596

664. WALLINGFORD. See "1890 Memoir," p. 197.

665. **Ware.** June 20, 1890; G. (60, 74). Lat. 51° 48′ 43″; Long. 0° 1′ 30″. In a field E. of the town, about 250 yards S.E. of Taylor's Malting-house. The spire of Christ Church bore W.S.W., about $\frac{1}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 19	11 7	17 33·2	17 30·5
+1 53	14 15	17 34·6	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	′	° ′
1	12 40	67 41·7	67 40·7
2	13 8	67 41·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 48		1·8079
V	11 20	1·8065	
V	14 29	1·8073	

666. **Watton.** September 7 and 8, 1892; G. (60, 74). Lat. 52° 34′ 2″; Long. 0° 50′ 15″ E. In the meadow to the W. of the Railway Station, the entrance to which bore 5° E. of N., about 150 yards distant.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 8	−2 16	9 49	17 4·9	17 15·4

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 7	1	14 22	68 3·7	68 5·7

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 7	D	13 52		
„ 7	V	13 32	1·7826	1·7794

667. WELLINGTON (Salop). September 6, 1890; B. (61, 83). Lat. 52° 42′ 18″. Long. 2° 30′ 38″. In a field in the Leegomery Road. Christ Church bore S.E., and St. Luke's Church, S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 28	10 57	19 2·5	19 1·0
+4 9	16 0	19 4·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 11	68 32·0	68 30·2
2	15 0	68 29·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 29		
V	11 50	1·7611	1·7623
V	16 45	1·7620	

668. **Wells.** September 1, 1890; G. (60, 74). Lat. 51° 12′ 55″; Long. 2° 38′ 55″. In a field a little to the W. of the Bristol Road, about ½ mile from the Cathedral, of which the central tower bore 21° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	°
+1 28	14 37	18 28·5	18 26·5
+3 9	15 36	18 28·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 22	67 35·3	67 35·4
2	14 11	67 36·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 49		
V	12 25	1·8169	1·8164
V	14 54	1·8144	

669. **Welshpool.** September 4, 1890; B. (61, 83). Lat. 52° 40′ 2″; Long. 3° 9′ 3″. In a field on the top of Cherrytree Hill, about ¾ mile N.W. of the town. The field is numbered 336 in the 25-inch Ordnance map.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 21	11 23	19 21·6	19 19·5
+4 53	16 50	19 21·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 47	68 36·3	68 34·6
2	14 57	68 33·8	
1	15 42	68 36·6	
2	16 13	68 33·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 24		1·7501
V	11 42	1·7509	
V	16 39	1·7479	

670. WEM. September 1, 1892; W. (70, 94). Lat. 52° 51′ 19″; Long. 2° 42′ 45″. Half-way between the two roads which lead eastward from the Railway Station, and about 300 yards E. of the Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 56	13 36	18 45·6	18 57·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 21	68 36·3	68 38·7
2	13 47	68 37·0	

Horizontal Force.

G.M.T.		H.	H_0
	h. m.		
D	14 48		
V	14 23	1·7440	1·7406

671. **Westerham.** June 24, 1890; B. (61, 83). Lat. 51° 15′ 30″; Long. 0° 4′ 12″ E. In Squeereys Park, overlooking Westerham. 70 yards E. of the boundary of Squeereys Court Grounds.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 27	11 5	17 20·7	17 16·9
	15 44	17 19·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 50	67 10·4	67 9·7
2	15 7	67 10·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 14		
V	11 31	1·8393	1·8391
V	16 0	1·8369	

672. **Weston-super-Mare.** August 29, 1890; G. (60, 74). Lat. 51° 20′ 13″; Long. 2° 56′ 45″. In a field W. of the road to Hutton, about 1½ miles S.E. of the town. A railway-bridge bore 20° W. of N., about ⅓ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 39	15 17	18 43·6	18 40·5
+4 53	17 18	18 42·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 4	67 42·7	67 40·9
2	16 23	67 40·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 52		
V	15 28	1·8118	18·123
V	17 28	1·8114	

673. **Wetherby.** July 31, 1889; R. (60, 74). Lat. 53° 55′ 10″; Long. 1° 22′ 54″. In the Park, about half way between the river and the Bramham Road, and a third of a mile south of the point where it joins the Collingham Road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 11	10 18	18 47·4	18 37·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	8 53	69 9·2	69 7·4
2	9 13	69 8·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 12	1·7155	
V	10 42	1·7159	1·7184

674. **Weymouth.** See "1890 Memoir," p. 151.

675. **Wheelock.** See "1890 Memoir," p. 152.

676. **Whitby.** September 30, 1891; W. (70, 94). Lat. 54° 28′ 49″; Long. 0° 38′ 12″. In a field N. of the road to Cross Butts. Sneaton Castle bore 30° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 14	11 5	18 15·2	18 20·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 35	69 21·1	69 22·0
2	13 3	69 20·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 22	1·7028	1·7014
D	15 55	1·7035	
V	14 44		
V	11 17	1·7052	
V	14 25	1·7033	

677. **Whitchurch** (Hants). September 9, 1890; G. (60, 74). Lat. 51° 13′ 20″; Long. 1° 21′ 34″. In Hurstbourne Park, about 1 mile S.S.W. of the town. A gate opening into the Andover Road bore 30° S. of E., about 80 yards distant. The Park Cottage (hidden by trees) bore 30° E. of N., about 350 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 42	14 10	17 40·9	17 38·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 38	67 20·4	67 20·7
2	12 56	67 22·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 55		
V	14 25	1·8348	1·8354

678. WHITCHURCH (Salop). September 24, 1890; B. (61, 83). Lat. 52° 58′ 4″; Long. 2° 41′ 18″. In the "Jubilee" field, and 200 yards S. of the Gas-works. The Church bore 60° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 31	11 20	19 0·8	18 59·4
+3 55	15 47	19 1·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 16	68 36·4	68 35·7
2	14 22	68 35·9	

Horizontal Force.

G.M.T.		H.	H_0,
	h. m.		
D	12 15		
V	11 41	1·7475	1·7480

679. WHITEHAVEN. See "1890 Memoir," p. 198.

680*a*. WHITEWELL (*a.*) August 15, 1890; R. and T. (70, 94). Lat. 53° 55′ 0″; Long. 2° 31′ 0″.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 6	10 32	19 14·0	19 11·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	10 52	1·7112	1·7122
V	11 6	1·7117	

680*b*. WHITEWELL (*b.*) August 15, 1890; R. and T. (70, 94). Lat. 53° 55′ 0″; Long. 2° 31′ 0″.

Declination.

Σ.	G.M.T.	δ	δ_0.
h. m.	h. m.	° ′	° ′
+3 6	14 45	19 8·3	19 5·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 14	69 9·5	69 9·3
2	11 0	69 10·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 18	1·7102	1·7112
V	14 31	1·7108	

681. WICKWAR. May 5, 1892; W. (70, 94). Lat. 51° 36′ 2″; Long. 2° 24′ 2″. At the north corner of the field immediately to the north of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
1 56	14 30	18 10·3	18 19·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 25	67 47·4	67 49·2
2	13 42	67 47·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 2		1·8005
V	12 29	1·8028	
V	14 42	1·8038	

682. WIGAN. September 25, 1891; W. (70, 94). Lat. 53° 32′ 49″; Long. 2° 39′ 46″. In a field to the W. of the road leading from Robin Lane to Marsh Green; 350 yards N.W. by W. of Laithwaite Farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 6	11 20	19 0·0	19 5·7
+1 58	14 22	19 0·5	

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	13 4	69 4·6	69 5·8
2	13 28	69 5·0	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
D	12 11		
V	11 39	1·7249	1·7229
V	14 36	1·7236	

683. Wigton. August 10, 1892; W. (70, 94). Lat. 54° 49′ 33″; Long. 3° 9′ 46″. In a field behind the King's Arms Hotel. At the N.W. corner, where the stream makes a bend.

Declination.

Σ.	G.M.T.	δ.	δ₀.
h. m.	h. m.	° ′	° ′
−1 58	10 43	19 35·9	19 47·3

Inclination.

Needle.	G.M.T.	θ.	θ₀.
	h. m.	° ′	° ′
1	12 7	69 48·7	69 50·7
2	12 22	69 49·1	

Horizontal Force.

G.M.T.		H.	H₀.
	h. m.		
D	11 36		
V	11 13	1·6720	1·6698

684. WIMBORNE. July 11, 1890; G. (60, 74). Lat. 50° 47′ 40″; Long. 1° 58′ 55″. In a field on the W. of the road between the Railway Station and the Town, about 50 yards from the River Allen, which forms the S. and W. boundaries of the field. Webb's Malthouse bore N.E., about 350 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0
h. m.	h. m.	° ′	° ′
−1 40	11 3	18 3·5	18 0·1
+3 4	14 28	18 3·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 43	67 10·2	67 10·3
2	13 13	67 12·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 51	1·8409	1·8401
V	11 18	1·8374	
V	14 6		

685. WINDSOR. See "1890 Memoir," p. 199.

686. WISBECH. See "1890 Memoir," p. 199.

687. WOBURN SANDS. July 31, 1890; R. and T. (70, 94). Lat. 52° 0′ 40″; Long. 0° 38′ 34″. In a field opposite the Swan Inn, and about 120 yards from the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	°
−0 34	11 57	18 3·2	18 0·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 43	67 59·4	67 57·8
2	12 4	67 57·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 45		
V	12 11	1·7908	1·7916

688. **Wolverhampton.** May 10, 1892; G. (60, 74). Lat. 52° 36′ 5″; Long. 2° 8′ 8″. In a field on the S. side of the new Race-course. The West end of the Grand Stand Buildings bore 22° W. of N., 120 yards distant; 50 yards N.W. of a brickfield.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 6	12 23	18 9·0	18 18·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 55	68 25·6	68 27·6
2	12 45	68 26·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 45		
V	12 13	1·7559	1·7531

689. **Woodhead.** August 18, 1892; G. (60, 74). Lat. 53° 29′ 40″; Long. 1° 49′ 34″. In a road which runs from the high road down to the Railway Station; the latter bore 30° N. of W., about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 9	h. m. 15 27	° ′ 18 29·5	° ′ 18 40·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	A 13 29 B 15 41	68 54·6	68 58·2
83 1	15 50	68 58·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 3	1·7325	1·7292
V	12 46		

690. **Wooler.** May 28, 1891; W. (70, 94). Lat. 53° 33′ 0″; Long. 2° 1′ 5″. In a field about 300 yards W.S.W. of "The Cottage" Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 7	11 44	19 20·0	19 22·9
+5 5	15 32	19 19·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 56	70 5·3	70 5·9
2	14 26	70 5·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 57		
V	12 2	1·6574	1·6568
V	16 1	1·6577	

691. **Worcester.** August 16, 1892; R. (73, 99). Lat. 52° 10′ 20″; Long. 2° 12′ 50″. In a field on the W. side of the Tewkesbury Road, on the top of the hill, about a mile S. of the town.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 37	14 36	18 29·9	18 39·1
+4 58	17 28	18 26·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 10	68 8·6	68 11·5
2	18 29	68 10·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 22	1·7748	
D	16 42		
V	14 56	1·7756	1·7721

692. **Worksop.** August 25, 1892; G. (60, 74). Lat. 53° 17′ 52″; Long. 1° 7′ 42″. In a field to the S. W. of the town, 50 yards W. of Slack Walk, and 60 yards N. of the point where the walk crosses a bye-road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 40	h. m. 10 38	° ′ 18 6·4	° ′ 18 17·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 37	68 42·0	68 43·8
83 1	11 48	68 41·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 8		
V	10 48	1·7434	1·7402

693. **Worthing.** See "1890 Memoir," p. 200.

694. **Worthington.** May 7, 1892; G. (60, 74). Lat. 52° 47′ 8″; Long. 1° 23′ 32″. In a field adjoining the Railway; 200 yards from the Station, which bore 27° N. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 12	h. m. 12 43	° ′ 17 46·7	° ′ 17 55·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 0	68 17·3	68 19·1
2	13 24	68 17·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 35		
V	12 2	1·7718	1·7691

695. **Wye.** June 28, 1890; G. (60, 74). Lat. 51° 10′ 45″; Long. 0° 56′ 30″ E. Near the centre of the cricket field S.E. of the village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 1	11 29	16 44·4	16 41·8
	14 25	16 45·2	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 2	67 4·6	67 3·6
2	13 33	67 4·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 10		
V	14 38	1·8424	1·8434

696. Great Yarmouth. September 19, 1890; G. (60, 74). Lat. 52° 38′ 7″; Long. 1° 43′ 53″ E. In a field on the E. side of the road to Caister, about 2 miles from Yarmouth and $\frac{1}{4}$ mile W. of the railway. A farmhouse bore 10° W. of S., about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 19	11 13	16 50·7	16 48·8
+1 11	13 18	16 50·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 12	67 58·9	67 57·6
2	10 50	67 57·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 56		
V	11 28	1·7859	1·7873
V	13 29	1·7878	

DESCRIPTIONS OF IRISH STATIONS.

697. **ANNALONG.** June 22, 1892; W. (70, 94). Lat. 54° 6′ 40″; Long. 5° 54′ 0″. In a field on the N. side of the main road, and about 200 yards E. of the bridge over the river, 400 yards N.W. of the quay.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 20	11 28	21 7·3	21 18·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 43	69 37·7	69 39·9
2	12 59	69 38·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 6		
V	11 40	1·6960	1·6928

698*a*. **ARMAGH.** See "1890 Memoir," p. 201.

698*b*. **ARMAGH.** June 24, 1892; W. (70, 94). Lat. 54° 21′ 10″; Long. 6° 38′ 53″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 25	11 20	21 23·5	21 35·4
+1 13	13 19	21 24·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 28	69 50·2	69 52·4
2	12 44	69 50·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 33	1·6794	
V	13 29	1·6792	1·6760

699. Athboy. May 20, 1891; G. (60, 74). Lat. 53° 38′ 13″; Long. 6° 53′ 40″. In a meadow on Gillstown Farm; about 1½ miles N.W. of Athboy; about 200 yards from the farmhouse which bore 10° S. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 6	15 53	21 30·9	21 33·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	′
2	16 9	69 28·6	69 29·1

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		
V	12 0	1·7060	1·7054

700. **Athenry.** July 21, 1891; G. (60, 74). Lat. 53° 18′ 15″; Long. 8° 44′ 54.″ On some rough enclosed land on the E. side of the road to Tuam, about $\frac{1}{3}$ mile from the Railway Station. The tower of the Church in the village bore 12° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 39	12 22	22 20·8	22 25·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 58	69 35·9	69 36·7
2	13 14	69 35·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 39		
V	12 32	1·6971	1·6959

701. **Athlone.** See "1890 Memoir," p. 201.

702. **Bagnalstown.** See "1890 Memoir," p. 202.

703. **Ballaghaderreen.** July 4, 1891; G. (60, 74). Lat. 53° 53′ 57″; Long. 8° 35′ 16″. In a large field to the W. of the village; 150 yards from the road. The tower of the Convent buildings bore 40° N. of E., and was about 350 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 13	10 44	22 27·6	22 31·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 11	70 4·4	70 4·6
2	12 31	70 3·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 18		
V	10 55	1·6680	1·6670

704. Ballina. See "1890 Memoir," p. 203.

705. Ballinahinch. July 18, 1891; G. (60, 74). Lat. 53° 27′ 10″; Long. 9° 52′ 6″. On a small piece of alluvial land above Cloonbeg Bridge, the principal arch of which bore due S., and was about 120 yards distant. Twenty yards from the bank of the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 11	15 15	22 41·1	22 45·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 30	69 52·5	69 52·8
2	16 47	69 51·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 57		
V	15 29	1·6731	1·6719

706. **Ballinalee.** May 28, 1891; G. (60, 74). Lat. 53° 45′ 20″; Long. 7° 39′ 16″. On the asphalte tennis court in front of Currygrane House, the residence of J. Wilson, Esq.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 1	16 42	21 54·1	21 57·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 13	69 45·4	69 45·4
2	16 0	69 44·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 53	1·6778	1·6769

707. **Ballinamore.** May 29, 1891; G. (60, 74). Lat. 54° 3′ 8″; Long. 7° 48′ 29″. In a field to the W. of the village, and about $\frac{1}{3}$ mile from the Church; 20 yards N. of the road to Fenagh.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 39	15 25	22 1·8	22 5·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 40	69 54·4	69 55·1
2	16 28	69 54·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 3		
V	15 35	1·6745	1·6736

708. Ballinasloe. July 24, 1891; G. (60, 74). Lat. 53° 19′ 50″; Long. 8° 14′ 30″. In Garbally Park, the demesne of the Earl of Clancarty; about ⅓ mile S.W. of the lodge nearest the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 58	13 59	22 2·0	22 6·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 11	69 27·5	69 28·7
2	13 25	69 28·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 42		
V	12 1	1·7018	1·7006

709. Ballybrophy Junction. June 7, 1892; W. (70, 94). Lat. 52° 54′ 8″; Long. 7° 36′ 24″. About 400 yards N.W. of the Railway Station, and 50 yards E. of the road to Borris in Ossory.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 33	14 25	21 27·9	21 38·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 42	69 4·7	69 6·2
2	15 5	69 3·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 51		
V	15 26	1·7316	1·7284

710. BALLYBUNNION. August 14, 1891; G. (60, 74). Lat. 52° 30′ 48″; Long. 9° 40′ 10″. In the meadow between the Parish Priest's house and the road, and on the N.E. side of the village. About 90 yards from the S.E. corner of the house, which bore 20° S. of E. The tower of the Church in the village bore S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
–2 34	10 20	22 30·0	22 35·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 11	69 9·7	69 11·3
2	11 39	69 10·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 2		
V	10 39	1·7259	1·7245

711*a* and *b*. BALLYCASTLE (Antrim). June 13 and 15, 1891; G. (60, 74). Lat. 55° 11′ 22″; Long. 6° 12′ 5″. In a meadow at the back of Churchfield House, the residence of J. Casement, Esq. First position 70 yards from the gate, between the yard and the meadow, which bore 15° N. of E. Second position 50 yards S. of first.

Declination.

	Date.	Σ.	G.M.T.	δ.	δ_0.
		h. m.	h. m.	° ′	° ′
a.	June 15	−2 16	10 22	21 54·8	21 58·4
b.	June 15	−0 42	11 54	21 54·2	21 57·8

Inclination.

	Date.	Needle.	G.M.T.	θ.	θ_0.
			h. m.	° ′	° ′
a.	June 13	1	14 5	70 21·6	70 22·7
a.		2	13 50	70 22·5	

Horizontal Force.

	Date.	G.M.T.		H.	H_0.
			h. m.		
a.	June 13	D	13 15	1·6435	1·6426
a.	,, 13	V	12 53		
b.	June 15	V	12 6	1·6469	1·6460

712. BALLYCASTLE (Mayo). July 8, 1891; G. (60, 74). Lat. 54° 16′ 42″; Long. 9° 22′ 17″. In a field on the S. side of the main street, nearly opposite May's Hotel. 150 yards from the Church, the tower of which bore due N., and 120 yards from the R.C. Chapel, the belfry of which bore 40° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 10	11 45	22 52·4	22 56·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 57	70 9·7	70 10·1
2	12 41	70 8·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 57	1·6510	1·6499

713. Ballygalley Bay. July 21, 1892; W. (70, 94). Lat. 54° 54′ 0″; Long. 5° 51′ 50″. 300 yards W.N.W. of the Coast Guard Station, and 70 yards W. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 39	12 13	21 10·9	21 22·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 33	70 11·4	70 12·8
2	13 48	70 10·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 2	1·6551	1·6517
V	12 27		

714*a* and *b*. BALLYMENA. June 12, 1891; G. (60, 74). Lat. 54° 53′ 2″; Long. 6° 13′ 36″. On the old race-course, about 3 miles N.E. of Ballymena. In the first position a small iron gate and stone stile bore 60° W. of S., and were about 70 yards distant. The second position was 50 yards E.N.E. of the first.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
a.	−1 30	11 16	21 9·9	21 13·5
b.	+1 22	14 4	21 23·7	21 27·3

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
a.	1 2	12 45 12 29	70 8·0 70 7·0	70 8·2

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
a.	D V	11 49 11 29	1·6572	1·6563
b.	V	14 15	1·6734	1·6725

715. S. OF BALLYMENA (1). July 2 and 4, 1892; W. (70, 94). Lat. 54° 48′ 12″; Long. 6° 17′ 0″. About 4½ miles south of Ballymena. In a field on the W. side of the Randelstown Road, about ½ mile S. of Carry's Bridge.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 4	+0 52	13 42	22 17·7	22 29·1

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 2	1	13 55	69 38·3	69 40·5
	2	14 10	69 39·1	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 2	D	12 12	1·6827	1·6792
„ 2	V	12 59		
„ 4	D	14 30	1·6825	
„ 4	V	13 56		

716. S. of Ballymena (2). July 4, 1892; W. (70, 94). Lat. 54° 48′ 40″; Long. 6° 16′ 35″. In a field to the N. of the road leading along the N. side of the river from Carry's Bridge. About 400 yards E.N.E. of the bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 31	11 18	18 41·4	18 52·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 25	69 55·8	69 58·3
2	12 37	69 57·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 28	1·6489	1·6456

717. N. of Ballymena (1). July 5, 1892; W. (70, 94). Lat. 54° 56′ 6″; Long. 6° 16′ 50″. About 5 miles N. of Ballymena, and to the S. of a road leading to a farm on the W. side of the main road just to the N. of Clogh Water Bridge. About halfway between the main road and the farm.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 49	12 9	21 23·6	21 35·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 26	70 32·5	70 34·6
2	13 40	70 33·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 52	1·6148	1·6115
V	12 22		

718. N. of Ballymena (2). July 5, 1892; W. (70, 94). Lat. 54° 55′ 28″; Long. 6° 15′ 48″. About 4 miles N. of Ballymena; 40 yards to the S. of the road leading from Clogh Water Meeting House to the railway, and about halfway between these places.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 56	15 56	22 26·7	22 38·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 36	71 7·8	71 9·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 7	1·6137	1·6104

719. Ballymoney. July 6, 1892; W. (70, 94). Lat. 55° 4′ 0″; Long. 6° 31′ 30″. About a third of a mile W.S.W. of the town. At the bend of a lane leading to some fields between the road to Leslie Hill and the railway.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 17	16 7	21 8·4	21 20·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 48	69 54·9	69 56·9
2	18 16	69 55·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 49	1·6718	1·6685
V	16 31		

720. **Ballymote.** July 3, 1891; G. (60, 74). Lat. 54° 5′ 16″; Long. 8° 31′ 27″. In a field on the N. side of the road running W. from the Railway Station, and about 350 yards from it. The obelisk on the hill bore 20° E. of N. and was about 250 yards distant. The spire of the Church near the Railway Station bore 18° N. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 44	12 7	22 25·7	22 29·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 23	70 1·8	70 3·4
2	13 8	70 3·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 43		
V	12 20	1·6643	1·6633

721. **Ballyragget.** June 8, 1892; W. (70, 94). Lat. 52° 47′ 32″; Long. 7° 19′ 22″. In a field on the N. side of the road to Castlecomer, and about 300 yards E. of the Railway Station. About 20 yards E. of the stream and 50 yards N. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 54	16 39	21 13·9	21 24·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 0	68 59·2	69 1·4
2	17 14	68 59·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 33	1·7335	1·7303

722. **Ballyshannon.** June 30, 1891; G. (60, 74). Lat. 54° 30′ 5″; Long. 8° 10′ 41″. In a field on the N. side of the road to Belleek. A house on the opposite side of the river bore 15° N. of W., and was about 250 yards distant. The spire of the Church at the N. end of the town bore 20° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 45	12 19	22 41·1	22 45·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 57	70 11·1	70 10·5
2	11 41	70 8·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 29	1·6517	1·6507

723. **Ballywilliam.** See "1890 Memoir," p. 203.

724 **Baltinglass.** May 13, 1891; G. (60, 74). Lat. 52° 57′ 8″; Long. 6° 42′ 26″. In a field on the E. side of the road from Baltinglass to Stratford, about 1 mile from the town, and 200 yards nearer the town than the point where the road branches off to the Grange; 30 yards from the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 12	h. m. 14 1	° ′ 21 12·0	° ′ 21 14·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 10	69 0·7	69 2·0
2	12 52	69 2·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 34	1·7272	1·7264
V	14 16		

725. **Bandon.** May 26, 1892; W. (70, 94). Lat. 51° 45′ 12″; Long. 8° 44′ 15″. To the N. of the town. In the Glebe House grounds, and about 120 yards S.S.W. of the house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 48	h. m. 11 15	° ′ 21 35·0	° ′ 21 45·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 21	68 34·7	68 36·9
2	13 3	68 34·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 11		
V	11 29	1·7624	1·7590

726. **Bangor.** See "1890 Memoir," p. 204.

727. **Bannow.** September 18, 1891; G. (60, 74). Lat. 52° 13′ 16″; Long. 6° 45′ 52″. About 120 yards S.E. of the Glebe House, and 20 yards from the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 19	13 50	20 38·6	20 43·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 7	68 42·5	68 44·7
2	13 21	68 44·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 28		
V	14 1	1·7476	1·7460

728*a*. Bantry. See "1890 Memoir," p. 205.

728*b*. Bantry. May 31, 1892; W. (70, 94). Lat. 51° 40′ 20″; Long. 9° 28′ 45″. The same station as that at which observations were made in the 1886 Survey. Ivy Cottage is now named Beach Cottage.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 26	11 1	21 49·7	22 0·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 44	68 32·0	68 35·3
2	13 6	68 34·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 4		
V	11 38	1·7675	1·7642
	14 40	1·7676	

729. Belfast. June 10, 1891; G. (60, 74). Lat. 54° 35′ 5″; Long. 5° 56′ 0″. In the centre of the football field behind Queen's College, 30 yards N. of the Anatomical building.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h m.	h. m.	° ′	° ′
+3 24	16 13	21 24·6	21 28·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 59	69 45·9	69 46·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 26	1·6768	1·6759

730. Belmullet. July 9, 1891; G. (60, 74). Lat. 54° 13′ 12″; Long. 9° 59′ 15″. In a field on the opposite side of the road to the Protestant Church, the W. window of which bore due E., and was 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 4	17 7	23 34·5	23 38·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 8	70 18·1	70 17·9
2	18 26	70 16·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 42	1·6513	1·6502
V	17 20		

731. **Bray.** May 16, 1891; G. (60, 74). Lat. 53° 12′ 5″; Long. 6° 6′ 55″. In a field on Crowbanks Farm, and on the S. side of the road running W. from Bray. The tower of the R.C. Chapel bore 11° N. of E. and the spire of the new Church 33° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 19	11 25	20 50·2	20 53·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 9	69 7·9	69 8·2
2	13 29	69 7·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 37		
V	12 5	1·7192	1·7184

732. **Broadway.** September 19, 1891; G. (60, 74). Lat. 52° 13′ 23″; Long. 6° 23′ 38″. In a field on the N. side of the Wexford Road, and about $\frac{1}{3}$ mile from the village. About 300 yards E. of a Methodist Chapel, and 150 yards W. of the turning leading from the main road to the village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 14	13 5	20 38·9	20 44·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 4	68 38·5	68 39·4
2	12 16	68 37·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 50		
V	13 18	1·7590	1·7574

733. Buncrana. June 22, 1891; G. (60, 74). Lat. 55° 8′ 34″; Long. 7° 27′ 20″. In a field on the N.E. side of a bye-road leading to the Glebe, about ½ mile N. of the town, and 350 yards from the main road. The R.C. Chapel bore 50° E. of N., and the shaft of a disused spinning mill, 20° W. of S., being about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 22	14 16	22 6·4	22 10·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 27	70 23·5	70 24·9
2	13 14	70 24·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 14		
V	14 32	1·6419	1·6409

734. **Burncourt.** May 24, 1892; W. (70, 94). Lat. 52° 19′ 11″; Long. 8° 5′ 57″. Half way between Mitchelstown and Caher, near Burncourt. About 50 yards to the S. of the main road, and 50 yards to the E. of the Burncourt River.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 57	h. m. 13 38	° ′ 21 25·7	° ′ 21 36·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 16	68 48·6	68 51·3
2	15 32	68 49·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 28	1·7449	1·7417
V	12 57		

735. **Carlow.** May 11, 1891; G. (60, 74). Lat. 52° 49′ 52″; Long. 6° 53′ 37″. In the grounds of Browne's Hill House. The lodge at the main entrance to the Park bore 10° W. of N., and was about 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 57	h. m. 11 51	° ′ 21 15·2	° ′ 21 18·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 35	68 59·0	68 59·6
2	13 16	68 59·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 37		
V	12 6	1·7334	1·7326

736. **Carnlough.** July 20, 1892; W. (70, 94). Lat. 54° 59′ 10″; Long. 5° 59′ 32″. In a field to south of the village. Half-way between Drumourne House and the sea.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 7	17 0	21 18·6	21 30·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 26	70 16·2	70 17·8
2	17 42	70 15·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	18 46		
V	18 14	1·6507	1·6473

737. Carrickfergus. June 29, 1892; W. (70, 94). Lat. 54° 43′ 47″; Long. 5° 46′ 2″. About 400 yards E. of Eden, 150 yards S.S.W. of the National School, and 50 yards S. of the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 21	h. m. 11 26	° ′ 21 38·0	° ′ 21 49·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 37	69 54·1	69 57·1
2	11 54	69 56·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 49		
V	12 14	1·6746	1·6709
V	13 34	1·6737	

738*a*. Carrick-on-Shannon. See "1890 Memoir," p. 205.

738*b*. Carrick-on-Shannon. June 13, 1892; W. (70, 94). Lat. 53° 56′ 36″; Long. 8° 5′ 46″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 35	14 26	22 10·3	22 22·0
+4 24	17 12	22 11·0	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 15	69 49·0	69 51·0
2	16 35	69 48·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 10		
V	14 40	1·6829	1·6793
V	17 22	1·6823	

739. Castlebellingham. June 17, 1892; W. (70, 94). Lat. 53° 54′ 7″; Long. 6° 24′ 48″. In the second field to the E. of the Railway Station. About 40 yards N. of the road to Castlebellingham.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 5	16 55	21 24·3	21 35·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 43	69 38·2	69 39·9
2	18 0	69 37·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	17 7	1·6933	1·6901

740. Castleblaney. June 2, 1891; G. (60, 74). Lat. 54° 7′ 37″; Long. 6° 44′ 55″. In a field on the N.E. side of the road to Monaghan, and about 1 mile from Castleblaney Railway Station, ½ mile S. of L. Drumiland.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 17	h. m. 12 42	° ′ 21 35·3	° ′ 21 38·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 26	69 57·9	69 58·1
2	13 14	69 56·9	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 12 52	1·6660	1·6652

741. Castlecomer. June 8, 1892; W. (70, 94). Lat. 52° 48′ 23″; Long. 7° 13′ 10″. In a field N. of the road leading to Ballyragget.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 21	h. m. 14 8	° ′ 21 16·7	° ′ 21 27·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 46	68 59·6	69 1·7
2	14 58	68 59·8	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 14 19	1·7356	1·7324

742. **Castlereagh.** See "1890 Memoir," p. 206.

743. **Castletown Berehaven.** August 26, 1891; G. (60, 74). Lat. 51° 39′ 15″; Long. 9° 54′ 16″. In a field overlooking the harbour, and about ¼ mile N.W. of the village. About 150 yards W.N.W. of Brandyhall Bridge, and 20 yards from a bye-road running parallel to the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 15	h. m. 14 20	° ′ 22 12·3	° ′ 22 17·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 21	68 37·1	68 38·3
2	15 35	68 37·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 53		
V	14 32	1·7609	1·7595

744. **Cavan.** See "1890 Memoir," p. 207.

745*a*. **Charleville.** See "1890 Memoir," p. 207.

745*b*. Charleville. June 3, 1892; W. (70, 94). Lat. 52° 20′ 54″; Long. 8° 40′ 22″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 33	11 26	21 45·5	21 56·9
	11 35	21 47·0	
+1 25	14 22	21 43·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 35	68 54·3	68 56·3
2	12 56	68 54·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 11		1·7371
V	13 46	1·7403	
V	14 40	1·7404	

746. Churchtown. September 2, 1891; G. (60, 74). Lat. 51° 49′ 30″; Long. 8° 4′ 28″. In a field on the N. side of a bye-road running E. from the village; about 50 yards from the point where the road takes a sudden bend to the S.E. The R.C. Chapel 10° N. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 13	13 37	21 21·8	21 26·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 55	68 32·7	68 33·9
2	13 9	68 32·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 8	1·7641	1·7626

747. CLIFDEN. See "1890 Memoir," p. 208.

748. CLONAKILTY. May 27, 1892; W. (70, 94). Lat. 51° 37′ 12″; Long. 8° 53′ 32″. In the field at the back of Mr. T. J. Canty's house in the Square.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 7	11 41	21 32·3	21 43·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 55	68 30·6	68 32·4
2	13 10	68 30·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 23	1·7696	1·7662
V	11 55		

749. CLONES. June 1, 1891; G. (60, 74). Lat. 54° 10′ 49″; Long. 7° 12′ 40″. In a meadow between the Glebe House and the road, and about a mile E. of Clones. The Spire of the Church bore due W. The Glebe House N.N.E., and was about 200 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 29	15 12	21 56·5	21 59·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 7	69 50·4	69 50·3
2	15 53	69 48·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 35		
V	15 24	1·6746	1·6738

750. CLONMEL. September 12, 1891; G. (60, 74). Lat. 52° 21′ 13″; Long. 7° 43′ 56″. In a field on the S. side of the Clonmel Road, and about $\frac{1}{4}$ mile W. of the point where it divides into two roads, both leading into Clonmel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 28	14 13	21 22·1	21 27·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 58	68 50·4	68 51·1
2	13 11	68 49·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 59	1·7424	1·7409
V	14 29		

751. COLERAINE. See "1890 Memoir," p. 209.

752. CONG. July 16, 1891; G. (60, 74). Lat. 53° 32′ 37″; Long. 9° 17′ 12″. In some open ground to the N. of the village, behind the School-house, the W. chimney stack of which bore 20° E. of S., and was about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 59	15 5	22 59·1	23 3·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 24	69 49·0	69 50·1
2	16 37	69 49·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 47	1·6848	1·6837
V	15 18		

753. Cookstown Junction. See "1890 Memoir," p. 209.

754. Cork. See "1890 Memoir," p. 210.

755. Cromwell's Hill (1). August 6, 1891 ; G. (60, 74). Lat. 52° 29′ 58″ ; Long. 8° 23′ 35″. About 220 yards from the Ordnance mark on the hill top, which bore 20° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 55	13 11	21 31·9	21 36·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 49	69 0·7	69 1·8

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	13 22	1·7333	1·7320

756. Cromwell's Hill (2). August 6, 1891 ; G. (60, 74). Lat. 52° 29′ 58″ ; Long. 8° 23′ 35″. This station was 100 yards S. of the first station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 17	14 7	21 35·6	21 40·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 42	68 59·8	69 0·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 18	1·7361	1·7348

757. Cromwell's Hill (3). August 6, 1891; G. (60, 74). Lat. 52° 29′ 45″; Long. 8° 23′ 35″. About 400 yards S.S.W. of the second station. In a field on the opposite side of the road to the two first positions, and 30 yards S. of the gate. The Ordnance mark bore 20° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 35	15 27	21 37·3	21 41·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 13	68 57·8	68 58 9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 47	1·7413	1·7400

758. Cromwell's Hill (4). August 7, 1891; G. (60, 74). Lat. 52° 30′ 3″; Long. 8° 24′ 2″. In a field near the bottom of the slope; about 500 yards due W. of the Ordnance mark.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 37	14 25	21 28·8	21 33·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 35	68 59·9	69 1·0

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 0		
V	14 35	1·7339	1·7326

759. Cromwell's Hill (5). August 7, 1891; G. (60, 74). Lat. 52° 30′ 3″; Long. 8° 24′ 20″. About 400 yards W. of the fourth Station. A farmhouse on the N. slope of Cromwell's Hill bore 10° N. of E., and was about $\frac{1}{4}$ mile distant; another farmhouse, about the same distance away, bore 30° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 49	16 40	21 35·5	21 40·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 23	68 56·5	68 57·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 50	1·7364	1·7351

760. **Culdaff.** July 13, 1892; W. (70, 94). Lat. 55° 17′ 5″; Long. 7° 8′ 11″. A mile to the E. of the village, and 30 yards N. of the main road. 200 yards W. of the Glebe House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 56	11 53 12 0	21 57·4 22 0·4	22 10·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 2	12 38 12 53	70 20·6 70 19·9	70 22·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 10	1·6506	1·6473

761. **Donegal.** See "1890 Memoir," p. 211.

762. Doneraile. May 25, 1892; W. (70, 94). Lat. 52° 13′ 38″; Long. 8° 35′ 1″. About 300 yards W. of the main road leading due N. out of the village; about half a mile N. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 35	12 15	21 39·6	21 40·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 48	68 49·2	68 52·3
2	13 3	68 51·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 3		
V	13 36	1·7441	1·7409

763. Downpatrick. June 9, 1891; G. (60, 74). Lat. 54° 19′ 15″; Long. 5° 43′ 15″. In a field about ¾ mile S.S.E. of the town; about 20 yards E. of the road to Newry. The tower of the Cathedral bore due N. Near the edge of a small bog.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 14	11 29	20 57·3	21 0·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 52	69 47·5	69 47·8
2	12 38	69 46·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 8	1·6764	1·6755
V	11 42		

764. **Draperstown.** June 18, 1891; G. (60, 74). Lat. 54° 47′ 40″; Long. 6° 47′ 22″. In a meadow on the W. side of the road running N.W. from the village, and next to the field through which a stream runs. The spire of the Church bore E. The observations were made close to the hedge on the side away from the road.

Declination.

Σ.	G M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 42	11 15	21 54·4	21 57·6
+1 50	14 39	21 53·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 41	70 9·5	70 9·3
2	12 26	70 7·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 57	1·6577	1·6562
V	11 27	1·6565	
V	14 51		

765. DROGHEDA. See "1890 Memoir," p. 211.

766. DROMORE. June 27, 1892; W. (70, 94). Lat. 54° 24′ 47″; Long. 6° 5′ 50″. Two miles to the E. of the town. In a field to the N. of the road to Ballynahinch, and opposite the road leading to Drummiller House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 29	15 16	21 4·2	21 15·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 59	69 29·4	69 31·3
2	16 14	69 29·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 51	1·6899	1·6866

767. DRUMSURN. July 15, 1892; W. (70, 94). Lat. 54° 59′ 34″; Long. 6° 52′ 24″. About half a mile to the S.E. of the village.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 2	15 50	21 44·3	21 56·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 45	70 18·0	70 20·9
2	15 0	70 19·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 38	1·6457	1·6423
V	16 5		

768. **Dublin.** See "1890 Memoir," p. 212.

769. **Dundalk.** June 3, 1891; G. (60, 74). Lat. 53° 59′ 38″; Long. 6° 23′ 30″. In a meadow on the E. side of the road to Blackrock, 100 yards from the road and 120 yards W. of the turning which runs N. to the Harbour.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 43	11 5	21 23·6	21 26·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 36	69 37·3	69 38·2
2	12 20	69 38·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 44		1·6909
V	11 19	1·6916	
V	13 17	1·6917	

770. **Dundrum.** June 8, 1891; G. (60, 74). Lat. 54° 15′ 17″; Long. 5° 51′ 3″. In a meadow on the W. side of the road to Newcastle, about ½ mile from the Railway Station. About 120 yards from a stone bridge over the railway which bore S.S.E. The Castle bore N.N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 26	15 9	21 7·4	21 10·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 33	69 46·7	69 47·0
2	16 18	69 45·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 45		
V	15 20	1·6763	1·6754

771. **Dungannon.** June 19, 1891; G. (60, 74). Lat. 54° 30′ 38″; Long. 6° 46′ 48″. In a small field about ¾ mile N.W. of the town, and adjoining a bye-road leading to Warren House. About 150 yards past the turning to the Workhouse. The Church Spire bore 40° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 5	14 53	21 31·0	21 34·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 21	70 3·3	70 4·0
2	16 8	70 3·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 29		
V	15 7	1·6684	1·6675

772. **Dungarvan.** September 11, 1891; G. (60, 74). Lat. 52° 5′ 27″; Long. 7° 38′ 4″. In a field on the S. side of the Cappoquin Road, about ½ mile from the town. The Christian Brothers' Schools bore 35° S. of E. About 120 yards N.W. of a rath or mound in the next field.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 40	14 17	21 12·8	21 18·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 15	68 38·7	68 39·7
2	15 27	68 38·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 53		
V	14 31	1·7533	1·7518

773. **Dungiven.** June 23, 1891; G. (60, 74). Lat. 54° 55′ 42″; Long. 6° 54′ 10″. In a field on the Lower Hass, about 1 mile E. of the village; 15 yards N. of the road and 30 yards E. of a cart-track. The Church Tower bore 20° S. of W., and the highest point of a neighbouring range of hills N.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 45	h. m. 11 10	° ′ 21 51·4	° ′ 21 55·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 40	70 18·0	70 19·7
2	12 26	70 19·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 54	1·6454	1·6444
V	11 22		

774. **Dunkineely.** June 29, 1891; G. (60, 74). Lat. 54° 37′ 46″; Long. 8° 22′ 15″. In a meadow in front of the Glebe House at Killaghtee. About 100 yards from the nearest corner of the house which bore 56° W. of N. 250 yards S.W. of the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 13	h. m. 11 40	° ′ 22 43·0	° ′ 22 47·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 6	70 16·3	70 16·9
2	12 53	70 16·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 13	1·6521	1·6511
V	11 51		

775. **Dunleer.** June 17, 1892; W. (70, 94). Lat. 53° 47′ 58″; Long. 6° 23′ 10″. Two and a half miles S. of Dunleer. About 120 yards W. of Stone House, and 50 yards S. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 51	11 59	21 11·3	21 22·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 45	69 35·2	69 36·7
2	14 6	69 34·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 4	1·6984	1·6952
V	12 31		

776. **Dunloy** (1). July 7, 1892; W. (70, 94). Lat. 55° 1′ 4″; Long. 6° 23′ 32″. To the S. of the road leading E. from the Railway Station, and on the W. bank of the stream. About 500 yards from the Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 8	11 48	22 55·5	23 7·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 32	69 52·7	69 54·6
2	12 48	69 52·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 6	1·6875	1·6842

777. **Dunloy** (2). July 7, 1892; W. (70, 94). Lat. 55° 1′ 5″; Long. 6° 22′ 30″. Three-quarters of a mile E. of Station I. About 50 yards S.W. of the main road, and 300 yards from the bridge over the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h m.	h. m.	° ′	° ′
+1 44	14 7	20 34·4	20 46·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 34	70 21·2	70 23·0

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 48		
V	15 0	1·6356	1·6323

778. **Dunmanway.** May 30, 1892 ; W. (70, 94). Lat. 51° 42′ 49″ ; Long. 9° 6′ 37″. In a field to the E. of the road which leads S. from the Railway Station. About 300 yards from the station, and to the E. of a cottage.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1·40	14 37	21 38·9	21 49·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 38	68 35·1	68 37·6
2	13 54	68 35·9	

Horizontal Force.

G.M.T.		H	H_0.
	h. m.		
V	12 41	1·7659	1·7625

779. **Eglington.** July 9 and 11, 1892; W. (70, 94). Lat. 55° 2′ 5″; Long. 7° 10′ 55″. In a field to the N. of the main road from Derry to Ballykelly, and on the W. side of a lane leading to Campbell's Town. About 80 yards from either road.

Declination.

Date.	Needle.	G.M.T.	δ.	δ_0.
July 11	h. m. −0 41	h. m. 12 7	° ′ 21 55·1	° ′ 22 6·8

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
July 9	1	h. m. 12 25	° ′ 70 19·2	° ′ 70 21·6
	2	12 43	70 19·9	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
July 9	D	h. m. 13 44		
„ 9	V	14 14	1·6461	1·6428

780. **Ennis.** August 1, 1891; G. (60, 74). Lat. 52° 50′ 15″; Long. 8° 59′ 0″. On some rough ground W. of the Catholic College, the tower of which bore 50° E. of N., and was about 150 yards distant; 50 yards N. of a stone-walled shed.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +0 56	h. m. 14 0	° ′ 22 4·8	° ′ 22 9·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 59	69 10·3	69 11·8
2	15 13	69 11·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 0		
V	14 11	1·7229	1·7216

781. Enniscorthy (1). September 23, 1891 ; G. (60, 74). Lat. 52° 31′ 12′ ; Long. 6° 36′ 50″. About 100 yards N.W. of Monart Bridge, and 5 yards from a bend in the bye-road leading up to the Church.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 8	11 22	20 51·0	20 56·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 28	68 58·0	68 59·2
2	12 40	68 58·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 59		
V	11 34	1·7299	1·7284

782 ENNISCORTHY (2). September 23, 1891; G. (60, 74). Lat. 52° 30′ 14″; Long. 6° 30′ 12″. About 150 yards N.E. of Cooladine Bridge, and 20 yards S. of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 2	14 37	20 50·6	20 56·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 16	68 53·9	68 54·5
2	15 29	68 52·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 47	1·7341	1·7326

783*a* and *b*. ENNISKILLEN. See "1890 Memoir," p. 213.

783*c*. ENNISKILLEN. June 15, 1892; W. (70, 94). Lat. 54° 21′ 7″; Long. 7° 39′ 8″. The same as Station 783 (*b*) at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 17	15 58	22 11·0	22 22·4
+5 9	17 56	22 11·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 7	70 5·3	70 7·7
2	15 25	70 6·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 38		
V	16 13	1·6632	1·6599
V	18 8	1·6629	

784. **Fermoy.** May 23, 1892; W. (70, 94). Lat. 52° 8′ 55″; Long. 8° 16′ 48″. On the race-course, about 100 yards W. of the road and 300 yards N.N.W. of the Railway Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 14	16 26	21 26·2	21 36·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 48	68 46·2	68 48·1
2	16 47	68 45·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 14		
V	14 46	1·7498	1·7466

785*a* and *b*. GALWAY. See "1890 Memoir," p. 214.

786. GLENCAR HOTEL. August 17, 1891; G. (60, 74). Lat. 52° 0′ 28″; Long. 9° 51′ 33″. About 200 yards S.E. of the Glencar Hotel, and 20 yards N. of the road leading up to the hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 54	13 51	22 18·4	22 23·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 32	68 49·9	68 51·5
2	11 47	68 50·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 34	1·7506	1·7492
V	12 9		

787. GLENFARNE. July 2, 1891; G. (60, 74). Lat. 54° 16′ 58″; Long. 7° 59′ 14″. On a small patch of meadow land about 300 yards due S. of the Railway Station. 25 yards E. of a bye-road running S., and 120 yards S.W. of a small white house. The Chapel bore 10° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 50	15 40	22 24·3	22 28·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 53	70 5·7	70 6·7
2	16 35	70 6·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 59	1·6652	1·6642

788. Glenmore (New Ross). September 16, 1891; G. (60, 74). Lat. 52° 21′ 6″; Long. 7° 1′ 30″. In a field near the top of a hill overlooking the village. About 300 yards E.S.E. of the R.C. Chapel and 70 yards N. of a bye-road running parallel to the Waterford Road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 5	13 39	20 49·9	20 55·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 29	68 51·3	68 52·0
2	11 42	68 50·2	

Horizontal Force.

G.M.T.		H.	H_0
	h. m.		
D	12 38	1·7361	1·7346
V	12 14		

789. Goragh Wood. June 23, 1892; W. (70, 94). Lat. 54° 15′ 27″; Long. 6° 22′ 8″. In a field to the E. of the road leading from Goragh Wood past the E. side of the grounds of Drumbanaghar House, and about 400 yards N. of the place where this road branches.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 12	h. m. 11 36	° ′ 21 23·2	° ′ 21 34·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 2	69 55·0	69 57·0
2	12 18	69 55·2	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 12 47	1·6729	1·6696

790. Gorey. May 15, 1891; G. (60, 74). Lat. 52° 40′ 22″; Long. 6° 17′ 50″. In a field in front of Dr. Weldon's house, and about 120 yards from it. About 300 yards from the Church, which bore 15° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 30	h. m. 11 7	° ′ 20 46·5	° ′ 20 49·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1 2	12 33 12 13	68 56·4 68 58·3	68 58·0

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 19	1·7274	1·7266

791. Gort. See "1890 Memoir," p. 215.

792. Gortin. July 12, 1892; W. (70, 94). Lat. 54° 43′ 32″; Long. 7° 13′ 32″. About 30 yards N. of the road which runs along the N. side of the river. Gortin Church bears S.S.W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° '	° '
−1 28	11 32	21 33·2	21 45·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° '	° '
1 2	11 17 12 32	70 13·5 70 13·9	70 15·7

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 12		
V	11 45	1·6546	1·6513

793. Greenore. See "1890 Memoir," p. 215.

794. Gweedore. June 25, 1891; G. (60, 74). Lat. 55° 2′ 57″; Long. 8° 13′ 20″. In a field about 200 yards N.W. of the Gweedore Hotel. The gate from the stables bore 30° S. of E. and was 60 yards distant. The summit of Mount Errigal bore 10° S. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 43	15 37	22 43·9	22 47·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 55	70 30·3	70 30·4
2	16 42	70 29·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 12	1·6385	1·6375
V	15 49		

795. Inishowen Head. July 14, 1892; W. (70, 94). Lat. 55° 14′ 2″; Long. 6° 55′ 40″. About 50 yards E. of the road leading to Inishowen Head from Stroove. The southern lighthouse bears due S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 27	11 33	21 54·4	22 6·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 55	70 22·2	70 23·9
2	13 10	70 21·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 22		
V	11 53	1·6430	1·6397

796. **Inniskeen.** June 16, 1892; W. (70, 94). Lat. 54° 0′ 23″; Long. 6° 34′ 26″. In a field to the E. of the road leading N. from the Railway Station. About 400 yards N. of the Station.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 9	13 56	21 20·8	21 31·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 4	69 48·7	69 50·9
2	13 20	69 49·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 10	1·6810	1·6778

797. **Kells.** See "1890 Memoir," p. 216.

798. **Kildare.** See "1890 Memoir," p. 217.

799. Kilfree Junction. June 14, 1892; W. (70, 94). Lat. 53° 59′ 32″; Long. 8° 26′ 8″. About 400 yards to the N.E. of the Railway Station, at the place where a lane, which starts a little to the E. of the Station and leads N., bends round to the E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 47	h. m. 12 8	° ′ 22 23·6	° ′ 22 35·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 34	69 57·6	69 59·6
2	12 49	69 57·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 30	1·6750	1·6717
V	13 6		

800. Kilkeel. June 21, 1892; W. (70, 94). Lat. 54° 3′ 43″; Long. 6° 0′ 40″. In a field to the W. of a short lane leading N. from the main road, nearly opposite the Hotel; about 400 yards S.W. of the Church and 300 yards W. of the Hotel.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 48	h. m. 12 2	° ′ 21 18·3	° ′ 21 29·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 37	69 38·2	69 40·2
2	13 53	69 38·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 46		
V	12 15	1·6908	1·6876

801. **Kilkenny.** See "1890 Memoir," p. 217.

802*a*. **Killarney.** See "1890 Memoir," p. 218.

802*b*. **Killarney.** June 2, 1892; W. (70, 94). Lat. 52° 3′ 48″; Long. 9° 32′ 23″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 10	10 49	22 7·6	22 17·9
+0 39	13 30	22 5·9	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 3	68 47·5	68 49·5
2	12 23	68 47·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	14 20		
V	11 3	1·7549	
V	13 42	1·7551	1·7512
V	14 49	1·7538	

803. Killenaule. June 6, 1892; W. (70, 94). Lat. 52° 34′ 23″; Long. 7° 42′ 45″. In a field to the S. of the road leading from Laffan's Bridge Railway Station to Killenaule. About 50 yards from the road and 400 yards E. of the railway. Due S. of a cottage on the N. side of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 51	12 0	21 25·2	21 36·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	15 0	68 55·1	68 56·9
1	14 43	68 54·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 50		
V	12 19	1·7401	1·7369

804. Kilrea. June 17, 1891; G. (60, 74). Lat. 54° 56′ 13″; Long. 6° 34′ 3″. On the E. side of the road to Maghera, about 1¼ miles from Kilrea; ¼ mile from the point where a bye-road across a bog leaves the main road, and 20 yards W. of the former.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 18	13 56	22 30·9	22 34·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 24	70 37·3	70 39·1
2	13 2	70 39·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27		
V	12 0	1·5865	1·5856

805. **Kilrush.** See "1890 Memoir," p. 219.

806. **Kilteely** (1). August 10, 1891; G. (60, 74). Lat. 52° 31′ 55″; Long. 8° 24′ 10″. In a field about 30 yards E. of the road and 200 yards N. of the point where the roads cross. 50 yards E. of a small farmhouse.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 55	14 43	23 47·5	23 52·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 41	68 48·3	68 49·4

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 14		
V	14 54	1·7556	1·7542

807. KILTEELY (2). August 10, 1891; G. (60, 74). Lat. 52° 31′ 40″; Long. 8° 24′ 7″. 20 yards E. of the road and about 250 yards S. of the cross-roads.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 54	16 41	21 42·4	21 47·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 18	69 6·8	69 7·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 52	1·7310	1·7296

808. KILTEELY (3). August 12, 1891; G. (60, 74). Lat. 52° 32′ 26″; Long. 8° 24′ 10″. In a field on the W. side of the road from Dromkeen to Kilteely, and about 500 yards from the turning called Crossalaght. 60 yards N.W. of a cottage on the opposite side of the road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 53	13 12	21 7·3	21 12·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1	h. m. 12 33	° ′ 68 31·7	° ′ 68 32·8

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 13 2	1·7787	1·7773

809. **Kilteely** (4). August 12, 1891; G. (60, 74). Lat. 52° 32′ 26″; Long. 8° 24′ 10″. About 100 yards N.N.W. of Station III.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 21	h. m. 14 7	° ′ 22 0·2	° ′ 22 5·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
1	h. m. 14 50	° ′ 68 57·1	° ′ 68 58·2

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 14 17	1·7318	1·7304

810. KILTEELY (5). August 12, 1891; G. (60, 74). Lat. 52° 32′ 38″; Long. 8° 23′ 58″. In a field on the E. side of the road, 50 yards E.N.E. of the point where a bye-road to Pallas leaves it.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +3 15	h. m. 15 34	° ′ 21 34·9	° ′ 21 39·8

Inclination.

Needle.	G.M.T.	θ.	θ.
1	h. m. 16 15	° ′ 69 10·0	° ′ 69 11·1

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 15 43	1·7217	1·7203

811. KINGSCOURT. May 19, 1891; G. (60, 74). Lat. 53° 54′ 30″; Long. 6° 48′ 41″. In a field on the S. side of the road to Bailieborough, and about $\frac{1}{3}$ mile from Kingscourt. 150 yards from the point where a bye-lane leaves the road. The Church at Kingscourt bore S.E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −0 47	h. m. 12 3	° ′ 21 29·9	° ′ 21 32·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	13 26	69 52·1	69 51·6
1	13 45	69 50·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 14	1·6781	1·6773

812. **Kinsale.** August 29, 1891 ; G. (60, 74). Lat. 51° 42′ 26″ ; Long. 8° 30′ 48″. In a field about 200 yards E. of the barracks. The Railway Station bore 20° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 9	10 40	21 36·2	21 41·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 55	68 28·9	68 30·0
2	12 10	68 28·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 22		
V	10 54	1·7633	1·7618

813. KNOCKLONG. June 4, 1892; W. (70, 94). Lat. 52° 26′ 17″; Long. 8° 24′ 50″. In the field to the N.W. of Knocklong cross-roads. About 30 yards to the W. of the road leading N., and 150 yards N. of the cross-roads.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+5 26	18 15	21 31·8	21 42·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	19 3	68 55·1	68 57·5
2	19 17	68 55·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	18 38	1·7410	1·7377

814*a* and *b*. LARNE. June 11, 1891; G. (60, 74). Lat. 54° 51′ 42″; Long. 5° 48′ 31″. In a meadow on the N. side of the Shore Road. The Chapel in the Cemetery bore W., the tower of Drumollis 10° E. of S., and the chimney stack of Larne Weaving Factory 30° S. of W. The first position was 50 yards from the gate and 5 yards N. of the meadow boundary, the second position 60 yards W.N.W. of the first.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
a.	+1 57	14 40	21 23·7	21 27·2
b.	+2 33	15 5	21 23·1	21 26·6

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
a.	1	14 7	70 7·5	70 8·4
	2	13 52	70 8·0	

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
a.	V	12 56	1·6592	1·6583
b.	V	15 17	1·6570	1·6561

815. LEENANE. See "1890 Memoir," p. 219.

816. LETTERKENNY. June 24, 1891; G. (60, 74). Lat. 54° 56′ 55″; Long. 7° 43′ 55″. In a meadow on the E. side of the town; about 300 yards from the main street, and 15 yards E. of a lane running down to the river. The spire of the Church in the town bore 25° N. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 8	15 8	22 20·2	22 24·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 33	70 22·0	70 22·4
2	16 13	70 21·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 45		
V	15 23	1·6410	1·6400

817. LIMERICK. See "1890 Memoir," p. 220.

818. LISBURN. June 10, 1891; G. (60, 74). Lat. 54° 31′ 3″; Long. 6° 2′ 23″. In the public park, 200 yards N.E. of the band-stand. The spire of the Cathedral bore 10° W. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 1	11 45	21 38·9	21 42·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 19	69 52·0	69 52·1
2	13 5	69 50·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 32		
V	12 0	1·6721	1·6712

819. LISDOONVARNA. See "1890 Memoir," p. 221.

820. LISMORE. See "1890 Memoir," p. 221.

821. **Little Saltee Island.** September 21, 1891; G. (60, 74). Lat. 52° 8′ 18″; Long. 6° 35′ 2″. Near the N. end of the island. About 150 yards S. of the Ordnance bench-mark.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 31	h. m. 11 0	° ′ 20 13·1	° ′ 20 18·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 46	68 49·6	68 50·1
2	11 58	68 47·9	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 11 12	1·7528	1·7513

822. **Londonderry.** See "1890 Memoir," p. 222.

823. **Loughrea.** July 23, 1891; G. (60, 74). Lat. 53° 12′ 6″; Long. 8° 32′ 32″. In a field on the E. side of a bye-road which turns southwards out of the main road running E. from Loughrea, and about 1 mile from the village. 120 yards N. of a small farmhouse. The Charter School bore due W.

Declination.

Σ	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 6 +0 53	11 56	22 22·0	22 26·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 10	69 30·6	69 31·0
2	11 25	69 29·5	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	12 37	1·7043	1·7031
V	12 7		

824. **Louisburgh.** July 14, 1891; G. (60, 74). Lat. 53° 45′ 48″; Long. 9° 48′ 38″. In a field behind the Glebe House. The tower of the Church bore 30° N. of E. and was about 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 0	11 59	22 45·5	22 50·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 10	69 59·5	69 59·5
2	13 24	69 57·8	

Horizontal Force.

G.M.T.		H.	H$_0$.
	h. m.		
D	12 38	1·6724	1·6713
V	12 13		

825. Lurgan. June 27, 1892; W. (70, 94). Lat. 54° 25′ 6″; Long. 6° 17′ 7″. About a mile S.S.E. of Waringstown, on the Banbridge Road. In the second field to the S.E. of the lane leading to Knockboy House, and about 80 yards to the W. of the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 18	11 37	21 22·3	21 33·5
	13 0	21 22·1	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 12	69 52·4	69 55·3
2	12 26	69 54·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 46	1·6736	1·6703

826. Macroom. September 1, 1891; G. (60, 74). Lat. 51° 53′ 32″; Long. 8° 56′ 44″. Near the W. edge of a field on the S. side of a bye-road which turns westward out of the main road to Cork, about ½ mile below New Bridge. About ½ mile from the main road.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 31	11 22	21 52·3	21 57·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 22	68 39·5	68 41·6
2	12 35	68 41·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	11 35	1·7520	1·7505

827. MALAHIDE. May 8, 1891; G. (60, 74). Lat. 53° 27′ 0″; Long. 6° 8′ 35″. On the common land near the shore. The N.W. corner of the Royal Hotel bore due W. and was about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 36	11 7	20 58·6	21 0·2
+1 9	13 47	20 56·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 45	69 15·0	69 14·2
2	12 26	69 12·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 46		1·7185
V	11 22	1·7198	
V	13 58	1·7185	

828. MALLOW. September 7 and 8, 1891; G. (60, 74). Lat. 52° 8′ 6″; Long. 8° 40′ 10″. In a field on the S. side of the Navigation Road; about $\frac{3}{4}$ mile from the Railway Station, and nearly opposite a turning leading to Killetra House.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 8	−0 57	11 46	21 51·2	21 56·3

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 7	1	15 15	68 50·5	68 51·5
" 7	2	15 31	68 50·0	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 7	D	14 42	1·7441	1·7426
" 7	V	14 21		

829. MANULLA JUNCTION. July 11 and 13, 1891; G. (60, 74). Lat. 53° 49′ 30″; Long. 9° 11′ 33″. In a field on the hillside, about 300 yards due S. of the Railway Station, 15 yards S.W. of an old entrenchment, and 10 yards N. of a bye-road running W. from the road to Ballinrobe.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
July 13	+1 8	13 19	22 44·8	22 49·2

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
July 11	1	11 10	70 0·1	70 1·0
„ 11	2	11 25	70 0·1	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
July 11	D	12 25	1·6755	1·6744
„ 11	V	12 3		

830. Maum Bridge. July 17, 1891; G. (60, 74). Lat. 53° 30′ 27″; Long. 9° 33′ 45″. On some flat alluvial land on the W. side of the road. About 120 yards S.E. of Kernakill Bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 59	15 58	22 34·0	22 38·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 7	69 56·9	69 57·4
2	17 22	69 56·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 10	1·6765	1·6754

831. **Maynooth.** May 25, 1891; G. (60, 74). Lat. 53° 22′ 41″; Long. 6° 36′ 2″. In the grounds behind the College. About 150 yards from the W. door, which bore 33° N. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 44	16 23	21 10·1	21 13·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	16 59	69 14·9	69 15·6

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	16 34	1·7131	1·7122

832*a* and *b*. **Midleton.** September 3, 1891; G. (60, 74). Lat. 51° 54′ 58″ Long. 8° 9′ 50″. In a field to the E. of the town; about 80 yards S. of a limestone quarry, and 300 yards E.N.E. of Queen's College. The spire of the Church bore 30° S. of W. and the shaft of the distillery due S. being about 250 yards distant. The second station was 40 yards E. of the first.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
	h m.	h. m.	° ′	° ′
I.	−1 56	10 58	21 20·4	21 25·5
II.	+1 39	13 50	21 23·8	21 28·9

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
I.	1 2	12 38 12 24	68 33·8 68 33·0	68 34·6

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
I.	D V	11 36 11 11	1·7590	1·7575
II.	V	14 0	1·7582	1·7567

833. Miltown Malbay. August 3, 1891; G. (60, 74). Lat. 52° 50′ 43″; Long. 9° 26′ 18″. In a meadow before the Atlantic Hotel, the nearest part of which bore 30° S. of E. and was about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 17	10 49	22 17·1	22 21·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1 2	11 34 11 48	69 19·1 69 17·7	69 19·4

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D V	12 12 11 0	1·7155	1·7142

834. **Mitchelstown.** September 10, 1891; G. (60, 74). Lat. 52° 15′ 36″; Long. 8° 16′ 0″. In a meadow adjoining the Glebe House, the nearest corner of which bore 30° E. of S., and was about 120 yards distant. The Railway Terminus bore 30° W. of S., and was 250 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 29	h. m. 11 19	° ′ 21 34·3	° ′ 21 39·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 35	68 50·3	68 51·0
2	12 50	68 49·3	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 11 32	1·7476	1·7461

835. **Molranny.** July 15, 1891; (G. 60, 74). Lat. 53° 54′ 5″; Long. 9° 41′ 17″. In a field near Newfield House, the chimney stack of which bore 40° E. of S., and was about 100 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +1 47	h. m. 14 5	° ′ 22 57·6	° ′ 23 2·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 3	70 12·6	70 13·2
2	13 17	70 12·0	

Horizontal Force.

G.M T.		H.	H_0.
	h. m.		
D	13 42		
V	14 19	1·6511	1·6500

836. Mount Nugent. May 21, 1891; G. (60, 74). Lat. 53° 49′ 34″; Long. 7° 18′ 15″. In a field about 300 yards N. of Arley Cottage, the residence of Major Somerset Maxwell.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 4	11 42	21 39·1	21 42·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 56	69 54·0	69 54·6
2	12 44	69 53·9	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 19		
V	11 53	1·6722	1·6714

837. **Mountrath.** June 7, 1892; W. (70, 94). Lat. 53° 0′ 16″; Long. 7° 28′ 40″. In a field to the N. of the Russian Road. About 80 yards N. of the road, and 80 yards W. of the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +5 16	h. m. 18 0	° ′ 21 33·4	° ′ 21 44·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 38	69 9·0	69 10·6
2	18 53	69 8·2	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 18 10	1·7289	1·7257

838. **Moville.** July 13, 1892; W. (70, 94). Lat. 55° 10′ 47″; Long. 7° 4′ 12″. About $1\frac{1}{4}$ miles to the W.S.W. of the town. Near the centre of the field to the W. of the Glebe House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. +2 38	h. m. 15 37	° ′ 21 58·8	° ′ 22 10·7

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 3	70 19·3	70 22·2
2	16 18	70 21·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	15 45	1·6425	1·6392

839. MULLINGAR. May 27, 1891; G. (60, 74), Lat. 53° 31′ 25″; Long. 7° 20′ 18″. In the middle of the kitchen garden at the back of Dean Swift's house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 24	15 8	21 36·7	21 39·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	17 0	69 26·3	69 26·9

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 25		
V	15 20	1·7064	1·7056

840. Naas. May 9, 1891; G. (60, 74). Lat. 53° 12′ 28″; Long. 6° 40′ 4″. In a large field on the W. side of the road leading S. from Naas. The Church Spire bore 17° E. of N., the Workhouse 30° N. of E. and the Barracks 25° W. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 27	12 12	21 13·5	21 16·7
+1 26	14 3	21 14·7	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	11 48	69 13·2	69 12·5
2	11 29	69 10·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 58	1·7189	1·7182
V	12 28		

841. Navan. May 18, 1891; G. (60, 74). Lat. 53° 39′ 50″; Long. 6° 40′ 10″. In a field on the N. side of the Drogheda Road; about 1 mile from the town. A round tower bore 50° N. of E., and was about $\frac{3}{4}$ mile distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 6	13 46	21 21·0	21 23·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 56	69 27·5	69 28·6
2	12 33	69 28·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 59		
V	11 35	1·7038	1·7031

842. Nenagh. July 31, 1891; G. (60, 74). Lat. 52° 51′ 39″; Long. 8° 13′ 5″. In a field on the N. side of the Limerick Road, about 200 yards from the road, and ¼ mile W. of Annebrook House, 20 yards N.N.E. of the gate between the field and an adjoining meadow.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 33	11 31	21 45·2	21 50·0
+1 13	14 8	21 45·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 30	69 12·0	69 12·9
2	12 57	69 11·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 5		
V	11 42	1·7274	1·7261
V	14 24	1·7274	

843. **Newcastle, West.** August 13, 1891; G. (60, 74). Lat. 52° 27′ 0″; Long. 9° 3′ 40″. On the lawn in front of the Castle, the residence of — Curling, Esq., about 50 yards from the entrance door of the house which bore 20° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 9	15 6	22 14·2	22 19·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 5	68 58·2	68 58·9
2	16 26	68 57·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 41		
V	15 16	1·7366	1·7352

844*a* and *b*. **Newry.** June 6, 1891; G. (60, 74). Lat. 54° 9′ 27″; Long. 6° 19′ 20″. In a meadow on the E. side of the road to Warrenpoint. About 1 mile from Newry. The first set of observations was made at a point 15 yards from the high road, the second declination and vibration 50 yards further E.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
a.	−1 42	11 1	22 49·4	22 52·6
b.	+1 15	13 27	22 43·8	22 47·0

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
a.	1	12 29	70 2·7	70 3·3
a.	2	12 14	70 2·8	

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
a.	D	11 42		
a.	V	11 15	1·6587	1·6579
b.	V	13 16	1·6614	1·6606

845. OLDCASTLE. May 22, 1891 ; G. (60, 74). Lat. 53° 44′ 21″ ; Long. 7° 12′ 15″. In a meadow in front of Beltrasna House ; about 100 yards from the Conservatory, which bore 28° N. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 24	14 54	21 34·9	21 37·9

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	15 22	69 42·1	69 43·2
2	13 34	69 43·1	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 33		
V	15 5	1·6892	1·6884

846. OMAGH. June 20, 1891; G. (60, 74). Lat. 54° 36′ 28″; Long. 7° 18′ 45″. In a meadow between Lisanelly House, the residence of — MONAGHAN, Esq., and the river. The house bore a little N. of E., and was about 300 yards distant. The Church spire bore 24° E. of S., and the river was 300 yards to the W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 6	h. m. 11 47	° ′ 21 57·7	° ′ 22 1·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 12	70 8·6	70 9·7
2	13 12	70 9·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 27	1·6602	1·6593
V	12 3		

847. OUGHTERARD. See "1890 Memoir," p. 223.

848. PARSONSTOWN. See "1890 Memoir," p. 223.

849*a* and *b*. PETTIGO. July 1, 1891; G. (60, 74). Lat. 54° 32′ 47″; Long. 7° 49′ 10″. In a field on the N. side of the road to Kesh; a little more than ½ mile E.S.E. of the village, and 200 yards past a turning into a lane which runs under the railway. The first position was 50 yards N. of the road and 10 yards W. of a cart-track between two fields. The second position was 40 yards N. of the first.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
a.	−1 30	11 23	22 6·6	22 10·7
b.	+1 17	14 10	22 3·9	22 8·0

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
a.	1	12 55	70 15·0	70 16·4
a.	2	12 39	70 16·3	

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
a.	V	11 39	1·6488	1·6478
b.	V	14 21	1·6445	1·6455

850. PORTUMNA. July 29, 1891; G. (60, 74). Lat. 53° 5′ 48″; Long. 8° 13′ 34.″ In the grounds of the Glebe House. About 80 yards from the entrance gate, which bore 40° S. of E.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 52	14 48	22 5·1	22 9·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 59	69 23·8	69 24·7
2	14 13	69 23·6	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 26	1·7092	1·7079
V	13 0		

851*a* and *b*. ROSCOMMON. July 6, 1891; G. (60, 74). Lat. 53° 37′ 58″; Long. 8° 11′ 36.″ At the N.W. corner of the field known as "The Fair Green." About 300 yards from the Old Castle, the central part of which bore 10° E. of N. The first declination was done at a point 100 yards further E.

Declination.

	Σ.	G.M.T.	δ.	δ_0.
a.	h. m. −1 59	h. m. 10 58	° ′ 22 18·1	° ′ 22 22·1
b.	+1 23	13 35	22 13·7	22 17·7

Inclination.

	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
b.	1	14 11	69 33·1	69 33·8
	2	13 12	69 32·8	

Horizontal Force.

	G.M.T.		H.	H_0.
		h. m.		
b.	D	12 30	1·6998	1·6987
	V	11 49		

852. **Shillelagh.** May 14, 1891; G. (60, 74). Lat. 52° 45′ 12″; Long. 6° 31′ 36″. In a meadow in front of Ardeen, the residence of — Brooke, Esq. The nearest corner of the house bore 20° W. of N., and was about 200 yards distant. Shillelagh Church Spire bore 5° N. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 42	h. m. 11 3	° ′ 21 1·5	° ′ 21 4·3

Inclination.

Needle.	G.M.T.	θ.	θ_0
	h. m.	° ′	° ′
1	12 25	69 0·2	69 1·6
2	12 44	69 1·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 45		
V	11 17	1·7250	1·7242

853. **Skibbereen.** August 28, 1891; G. (60, 74). Lat. 51° 33′ 13″; Long. 9° 16′ 40″. In a meadow on the N. side of the road to Schull, about $\frac{1}{3}$ mile from the West Carbery Tramway Terminus; 25 yards N. of a small stone bridge, and 10 yards from the edge of a small wood.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m. −1 55	h. m. 11 0	° ′ 21 46·3	° ′ 21 51·4

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 24	68 31·7	68 32·9
2	12 25	68 31·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 40		
V	11 11	1·7678	1·7663

854*a*. Sligo. See "1890 Memoir," p. 224.

854*b*. Sligo. June 14, 1892; W. (70, 94). Lat. 54° 16′ 34″; Long. 8° 28′ 36″. The same station as that at which observations were made in the 1886 Survey.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 21	16 16	22 15·3	22 26·5
+4 41	17 30	22 14·8	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	18 16	70 8·4	70 10·4
2	18 37	70 8·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 56		
V	16 28	1·6572	1·6527
V	18 0	1·6548	

855. Sneem. August 22, 1891; G. (60, 74). Lat. 51° 50′ 17″; Long. 9° 53′ 57″. On the left bank of the river, 15 yards from the water, and 80 yards above the bridge.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−3 4	9 55	22 20·1	22 25·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 46	68 42·6	68 43·1
2	11 1	68 41·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 27	1·7564	1·7550
V	10 14		

856. Sperrin. July 8, 1892; W. (70, 94). Lat. 54° 47′ 26″; Long. 6° 59′ 50″. About ½ mile E. of Sperrin Lodge, just to the E. of a stream which joins the river, and about 10 yards N. of the river.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 57	13 20	21 41·9	21 53·6

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 38	70 15·4	70 17·5
2	12 56	70 15·5	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 2	1·6528	1·6495

857. **Spiddle.** July 20, 1891; G. (60, 74). Lat. 53° 14′ 48″; Long. 9° 17′ 8″. In the meadow in front of Spiddle House, the residence of Captain Coleman-Lynch. The gate at the entrance from the road bore 10° E. of S., and was about 120 yards distant. The door of the house bore 15° E. of N. and was 150 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 41	16 38	22 41·8	22 46·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 19	69 29·6	69 29·3
2	17 33	69 27·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 57		
V	16 54	1·7153	1·7141

858. **Strabane.** See "1890 Memoir," p. 225.

859. **Stradbally.** July 27, 1891 ; G. (60, 74). Lat. 53° 0′ 38″ ; Long. 7° 9′ 20″. In the grounds of Stradbally Hall, the residence of Colonel R. A. G. Cosby. 180 yards N.W. of the entrance porch.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 56	15 53	21 28·9	21 33·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 4	69 6·9	69 7·0
2	17 20	69 5·2	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 31		
V	16 6	1·7242	1·7230

860. **Stranorlar.** June 27, 1891 ; G. (60, 74). Lat. 54° 48′ 8″ ; Long. 7° 46′ 33″. In a field behind the R.C. Chapel near the Railway Station. About 90 yards from the E. end of the Chapel, which bore 38° E. of S ; 15 yards from the bank of a stream.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 53	11 2	22 15·1	22 18·3
+1 12	14 1	22 13·4	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 34	70 18·3	70 20·0
2	12 21	70 20·4	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 39		1·6464
V	11 13	1·6473	
V	14 12	1·6475	

861. **Street.** May 25, 1891; G. (60, 74). Lat. 53° 40′ 54″; Long. 7° 29′ 40″. In the grounds of Daramona, the residence of W. E. Wilson, Esq. About 120 yards S.W. of the house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 45	11 4	21 44·1	21 47·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
2	12 12	69 42·4	69 43·0

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 44		
V	11 18	1·6897	1·6889

862. TAGHMON. September 17 and 22, 1891; G. (60, 74). Lat. 52° 19′ 28″; Long. 6° 38′ 28″. In a field about half a mile E. of the village, and 100 yards S. of the Wexford Road. About 200 yards E. of a bend in this road, and 300 yards N.E. of Powell Marn Farmhouse.

Declination.

Date.	Σ.	G.M.T.	δ.	δ_0.
	h. m.	h. m.	° ′	° ′
Sept. 22	−0 59	11 32	20 46·4	20 51·7

Inclination.

Date.	Needle.	G.M.T.	θ.	θ_0.
		h. m.	° ′	° ′
Sept. 17	1	13 29	68 49·2	68 50·2
	2	13 42	68 48·6	

Horizontal Force.

Date.	G.M.T.		H.	H_0.
		h. m.		
Sept. 17	D	14 48	1·7418	1·7403
„ 17	V	14 8		

863. TEMPLEMORE. June 7, 1892; W. (70, 94). Lat. 52° 47′ 35″; Long. 7° 50′ 10″. In a field to the S. of the main street; about 300 yards from the Barracks, which bore 22° S. of W.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h m.	° ′	° ′
−3 12	9 41	21 33·5	21 44·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	10 32	69 0·0	69 1·6
2	10 47	68 59·1	

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 11 15	1·7332	1·7299

864. **Templepatrick** (1). June 30, 1892; W. (70, 94). Lat. 54° 42′ 18″; Long. 6° 5′ 54″. In the grounds of Upton Castle; 150 yards due W. of the Castle.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−0 55	11 55	21 9·8	21 21·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 37	71 49·8	71 51·6

Horizontal Force.

G.M.T.		H.	H_0.
V	h. m. 12 8	1·5407	1·5374

865. **Templepatrick** (2). June 30, 1892; W. (70, 94). Lat. 54° 42′ 18″; Long. 6° 6′ 8″. In the grounds of Upton Castle, 350 yards due W. of the Castle.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+2 4	14 13	22 0·8	22 12·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 9	72 31·3	72 33·
2	13 23	72 32·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 23	1·4896	1·4863

866. **Thomastown.** September 14, 1891; G. (60, 74). Lat. 52° 31′ 50″; Long. 7° 8′ 40″. In the grounds of the Glebe House, which bore N.N.E., and about 120 yards distant. 20 yards W. of the drive.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+3 55	16 30	21 30·5	21 35·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	17 42	68 46·8	68 47·5
2	17 46	68 45·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	17 3		
V	16 39	1·7499	1·7484

867. **Thurles.** August 5, 1891 ; G. (60, 74). Lat. 52° 40′ 28″ ; Long. 7° 48′ 50″. In a field on the W. side of the Clonmel road ; just outside the town and about 120 yards W. of the point where a bye-road turns back at an acute angle towards the town again. The tower of the R.C. Cathedral bore 30° E. of N.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 7	10 41	21 33·5	21 38·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 10	68 53·8	68 54·8

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 22		
V	10 52	1·7373	1·7360

868. TIPPERARY. See "1890 Memoir," p. 225.

869. TORR HEAD. July 19, 1892; W. (70, 94). Lat. 55° 11′ 47″; Long. 6° 5′ 48″. About 1 mile W. of Torr village, and to the N. of a branch road leading in a north-easterly direction from the Ballycastle Road. On a patch of chalk shown on the Geological Map.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 56	14 5	21 12·0	21 23·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	14 48	70 30·0	
2	15 2	70 30·7	70 32·3

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	14 16	1·6331	1·6297

870*a*. TRALEE. See "1890 Memoir," p. 226.

870*b*. TRALEE. August 15, 1891; G. (60, 74). Lat. 52° 16′ 0″; Long. 9° 42′ 10″. In the demesne on the S. side of the town. The spire of the R.C. Church on the N. edge of the demesne bore 10° E. of N., and was about 350 yards distant. The lodge near the Central Hotel bore 30° W. of N., and was about 350 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 55	11 1	22 29·5	22 33·4
+1 13	13 34	22 27·5	

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 19	69 0·7	69 1·0
2	12 31	68 58·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 46		
V	11 12	1·7367	1·7355
V	13 44	1·7370	

871. Tuam. July 22, 1891; G. (60, 74). Lat. 53° 31′ 3″; Long. 8° 50′ 53″. In the grounds of the Bishop's Palace, which bore S.S.W., and was about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−2 4	11 2	22 21·7	22 26·2

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 44	69 40·8	69 41·4
2	12 57	69 40·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	13 40		
V	12 17	1·6949	1·6937

872. TULLAMORE. July 25, 1891; G. (60, 74). Lat. 53° 14′ 26″; Long. 7° 31′ 40″. In the park in front of Brookfield House, the residence of E. de S. Hamilton Brown, Esq.; 120 yards due N. of the porch of the house.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+0 57	13 24	21 42·1	21 46·5

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 37	69 22·2	69 22·5
2	12 52	69 20·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 11		
V	11 49	1·7095	1·7083

873. TULLOW (Sandbrook). May 12, 1891; G. (60, 74). Lat. 52° 45′ 33″; Long. 6° 45′ 31″. In the meadow in front of Sandbrook House, the residence of R. Clayton-Brown, Esq. About 250 yards from the door of the house, which bore 3° E. of S.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+1 29	14 11	21 8·2	21 11·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 13	68 57·6	68 57·9
2	13 32	68 57·0	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	15 39		
V	14 23	1·7311	1·7303

874. VALENTIA (1) and (2). See "1890 Memoir," p. 226.

875*a*. VALENTIA (3). August 20, 1891; G. (60, 74). Lat. 51° 54′ 30″; Long. 10° 18′ 10″. On the lawn, 7 yards S. of the Magnet House.

Declination.

Σ.	G.M.T.	δ.	δ_0
h. m.	h. m.	° ′	° ′
−2 3	10 54	22 28·8	22 33·8

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	12 3	68 47·1	68 48·9
2	12 15	68 48·3	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	11 41		
V	11 15	1·7529	1·7515

875*b*. VALENTIA (4). August 19, 1891; G. (60, 74). Lat. 51° 54′ 30″; Long. 10° 18′ 10″. In the Magnet House of the Observatory.

Declination.

	G.M.T.	δ.	δ_0.
	h. m.	° ′	° ′
Fixed mark used . .	11 0	22 24·0	22 29·0

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	16 52	68 50·3	68 49·7
2	17 16	68 46·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	16 10	1·7530	1·7516
V	15 37		

876. Warrenpoint. June 20, 1892; W. (70, 94). Lat. 54° 6′ 11″; Long. 6° 14′ 2″. About 120 yards S.E. of Clonallon Glebe House.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
+4 56	17 46	21 58·2	22 9·1

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 10	69 49·2	69 50·4
2	13 31	69 47·8	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
V	12 32	1·6790	1·6758

877. **Waterfoot.** See "1890 Memoir," p. 227.

878. **Waterford.** See "1890 Memoir," p. 228.

879. **Westport.** See "1890 Memoir," p. 228.

880. **Wexford.** See "1890 Memoir," p. 229.

881. **Wicklow.** See "1890 Memoir," p. 230.

882. **Youghal.** September 4, 1891; G. (60, 74). Lat. 51° 57′ 58″; Long. 7° 52′ 0″. In a field 30 yards N. of a bye-road leading to Muckridge House. Brown's Castle bore 25° E. of S., and was about 300 yards distant.

Declination.

Σ.	G.M.T.	δ.	δ_0.
h. m.	h. m.	° ′	° ′
−1 20	11 20	21 17·2	21 22·3

Inclination.

Needle.	G.M.T.	θ.	θ_0.
	h. m.	° ′	° ′
1	13 15	68 33·8	68 35·4
2	13 1	68 34·7	

Horizontal Force.

G.M.T.		H.	H_0.
	h. m.		
D	12 1		
V	11 32	1·7587	1·7572

CALCULATION OF THE ISOMAGNETIC LINES.

(1) *The Isogonal Lines.*

The plan adopted for the determination of the terrestrial isogonals was precisely the same as that employed in the first survey.

The country was divided into the same nine overlapping districts. The stations were weighted so as to make the weighted number of stations per unit of area about the same everywhere.

The point corresponding to the means of the weighted latitudes and longitudes of all the stations in a district was called the *central station,* and the mean of the weighted declinations was taken as the declination at that point.

The rates of change of the declination per degree of latitude and longitude were then calculated on the supposition that they were uniform over the whole of each district.

The numerical calculations were heavy, and were entirely carried out by Messrs. GRAY and WATSON. At first the Scotch stations were divided into two groups of about seventy each, uniformly distributed over the country. The results obtained were as follows:—

Central station.		Declination. δ_0.	$\frac{d\delta}{dl}$.	$\frac{d\delta}{d\lambda}$.
Latitude (l_0).	Longitude (λ_0).			
° ′	° ′	° ′	′	′
56 43·0	4 22·2	20 58·9	13·3	30·7
56 33·1	4 20·8	20 57·9	13·1	33·9

We had hoped that labour might have been saved by using only some of the stations in the formation of the terrestrial lines, but the above values of $d\delta/d\lambda$ were hardly in sufficient accord to justify such a course. Nearly all the stations were therefore used at which observations had been made since the previous survey up to that time (January, 1892), the total number thus employed being about 450. About ten stations at which great magnetic disturbances were known to exist were omitted.*

The following table contains the boundaries of the nine districts, the latitudes and longitudes of the central stations, the values of the changes of declination per degree of latitude and longitude ($d\delta'/dl$ and $d\delta'/d\lambda$), both expressed in minutes of arc.

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* One or two stations were included at which there are large disturbances which had not been detected at the time when the calculations were made, as the normal values could not be determined before the terrestrial lines were drawn. It is probable that the differences between the results given by the two groups of stations would have been much reduced if these stations had been omitted.

TABLE I.

District.	Boundaries.		Central station.		Declination at central station $=\delta'_0$.	$x=\frac{d\delta'}{dl}$.	$y=\frac{d\delta'}{d\lambda}$.
	Lat.	Long.	Lat.	Long.			
	° °	° °	° ′	° ′	° ′	′	′
I.	All Scotland		56 38·2	4 21·5	20 58·4	13·1	32·5
II.	54 to 57	0 to 6 W.	55 23·9	3 23·7	20 7·9	15·6	35·2
III.	52 55	0 5 W.	53 24·2	2 5·9	18 51·8	14·6	30·3
IV.	50 53	2 E. 3 W.	51 47·4	0 46·0 W.	17 45·7	18·9	25·4
V.	50 55·5	5 W. 10 W.	54 2·7	7 37·9	22 3·9	22·6	32·8
VI.	52 55	3 W. 8 W.	53 30·5	5 35·2	20 46·0	18·7	32·2
VII.	49 52	1 W. 6 W.	51 5·3	3 8·0	18 38·4	12·5	30·5
VIII.	51 54	5 W. 11 W.	52 51·5	8 11·6	21 53·9	24·1	30·9
IX.	50 53	3 W. 8 W.	51 41·9	4 32·6	19 35·5	19·4	30·8

By means of these formulæ the Declination was calculated for all points within the United Kingdom, defined by whole degrees of longitude and half degrees of latitude.

All these values are given in the following Table. The figures in brackets at the end of a row indicate the number of the district from which it was deduced. Where two or more districts overlap, the individual Declinations are given in italics, and the means in ordinary type.

The agreement between the numbers is about as good as that obtained on the previous occasion.

TABLE

Lat.	Longitude.					
	10° W.	9°.	8°.	7°.	6°.	5°.
° ′	° ′	° ′	° ′	° ′	° ′	° ′
58 30			(1) 23 21·2	22 48·7	22 16·2	21 43·7
57 30			(1) 23 7·9	22 35·5	22 3·0	21 30·6
56 30			(1) 22 54·8	22 22·3	*21 49·9* (2) *21 56·9* 21 53·4	*21 17·4* *21 21·7* 21 19·6
55 30			(5) 22 48·9	22 16·1	(2) *21 41·4* *21 43·3* (5) 21 42·3	21 6·1
54 30		(5) 22 59·1	22 26·3	*21 53·5* (6) *21 50·1* 21 51·8	(2) *21 25·7* *21 20·7* (5) *21 17·9* 21 21·4	*20 50·4* *20 45·8* 20 48·1
53 30	(5) *23 9·2* (8) *23 5·1* 23 7·2	*22 36·4* *22 34·3* 22 35·4	*22 3·6* *22 3·4* 22 3·5	*21 30·8* (6) *21 31·3* *21 32·5* 21 31·5	*20 58·0* (5) *20 59·1* *21 1·6* (8) 20 59·6	20 27·0
52 30	(8) 22 41·1	22 10·2	21 39·3	(6) *21 12·6* *21 8·4* (9) *21 6·7* 21 9·2	*20 40·4* *20 37·5* (8) *20 36·0* 20 38·0	*20 8·3* *20 5·2* 20 6·8
51 30	(8) 22 17·0	21 46·2	21 15·3	*20 44·4* (9) *20 47·3* 20 45·9	*20 13·5* (8) *20 16·5* 20 15·0	*19 45·7* (7) *19 40·4* 19 43·1
50 30				(9) 20 27·9	19 57·1	*19 26·3* (7) *19 28·0* 19 27·2
49 30						(7) 19 15·5
	10° W.	9°.	8°.	7°.	6°.	5°.

II.

Longitude.							Lat.
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
21 11·2	20 38·8	20 6·3	19 33·9 (1)				58 30
20 58·1	20 25·6	19 53·2	19 20·7 (1)				57 30
20 45·0 *20 46·5* 20 45·8	*20 12·5* *20 11·2* 20 11·9	*19 40·0* *19 36·0* 19 38·0	*19 7·6* (1) *19 0·8* (2) 19 4·2				56 30
20 30·9	19 55·7	19 20·4	18 45·2 (2)				55 30
20 15·2 (3) *20 5·4* *20 13·6* (6) 20 11·4	*19 39·9* *19 35·2* 19 37·6	*19 4·7* *19 4·9* 19 4·8	*18 29·5* (2) *18 34·7* 18 32·1	18 4·4 (3)			54 30
(3) *19 50·8* *19 54·9* (6) 19 52·8	19 20·5	18 50·3	18 20·0	17 49·8 (3)			53 30
19 36·1 (6) (3) *19 36·1* *19 34·4* 19 35·5	*19 5·9* (4) *18 55·8* *19 3·6* (9) 19 1·8	*18 35·6* *18 30·4* 18 33·0	*18 5·4* *18 5·0* 18 5·2	*17 35·1* (3) *17 39·6* 17 37·4	17 14·2	16 48·8 (4)	52 30
19 15·0 *19 9·9* 19 12·5	*18 44·2* (9) (4) *18 36·9* *18 39·4* 18 40·2	*18 11·5* *18 8·9* 18 10·2	*17 46·1* *17 38·4* (7) 17 42·3	17 20·7	16 55·3	16 29·9 (4)	51 30
18 55·5 *18 57·5* 18 56·5	*18 24·8* (9) (4) *18 18·0* *18 26·9* 18 23·2	*17 52·6* *17 56·4* 17 54·5	*17 27·2* *17 25·9* (7) 17 26·6	17 1·8	16 36·4	16 11·0 (4)	50 30
18 45·0	18 14·5	17 44·0	17 13·5 (7)				49 30
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	

The *district curves* were obtained from these numbers exactly as before. They are shown in dotted lines on Map 1.

A formula was then sought, which should express (1) the values of the Declinations at the central stations, and (2) the forms of smooth curves representing the general form of the broken district curves.

It is perhaps unnecessary to describe in detail the steps by which the final result was reached. It will be sufficient to state our conclusions and give *à posteriori* the evidence which we think justifies them.

We find that the equation to the terrestrial isogonals for 1891 can be obtained from that for 1886 by adding to it for the district south of latitude 54° 30′ N. the terms*—

$$- 34'{\cdot}0 - 0'{\cdot}6\,(l - 49{\cdot}5) - 0'{\cdot}3\,(\lambda - 4)$$
$$+ 0'{\cdot}01\,(l - 54{\cdot}5)^2\,(\lambda - 4)^2,$$

while for the district north of latitude 54° 30′ N. we add the first three terms of this expression only, *i.e.*,

$$-34'{\cdot}0 - 0'{\cdot}6\,(l - 49{\cdot}5) - 0'{\cdot}3\,(\lambda - 4).$$

In both cases l and λ are the latitude and longitude expressed in terms of degrees and fractions of a degree.

Hence the equation to the terrestrial isogonals (*cf.* "1890 Memoir," p. 240) south of latitude 54° 30′ on January 1, 1891 is

$$\begin{aligned}\delta = 18^\circ\,37' + 18'{\cdot}5\,(l - 49{\cdot}5) - 3'{\cdot}5 \cos\{45^\circ\,(l - 49{\cdot}5)\}\\ + \{26'{\cdot}3 + 1'{\cdot}5\,(l - 49{\cdot}5)\}\,(\lambda - 4)\\ + 0'{\cdot}01\,(\lambda - 4)^2\,(l - 54{\cdot}5)^2,\end{aligned}$$

and north of latitude 54° 30′ the same expression holds good if the last term, *i.e.*,

$$0'{\cdot}01\,(\lambda - 4)^2\,(l - 54{\cdot}5)^2,$$

be omitted.

By means of this formula the calculated Declinations were determined at all points given by the intersections of lines corresponding to entire degrees of latitude and longitude. The numbers thus found, together with the differences between them, are given in the following Table III.

In the reduction of our earlier survey the calculated values at the different stations were determined direct from the algebraical formulæ for the terrestrial isomagnetics.

In the work described in this paper we have on the contrary used tables such as that given on the opposite page and have assumed that the rate of change of the elements with latitude and longitude might be taken as constant for intervals less than a degree.

As the nearest intersection of whole degrees of latitude and longitude was always

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* In these equations the factors which contain l and λ are to be regarded as mere numerals.

BRITISH MUSEUM
NATURAL HISTORY

Latitude.	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.	
59°							23° 33'·1	*40'·6*	22° 52'·5	*40'·5*	22° 12'·0	*40'·6*
							24'·9		*23'·4*		*21'·9*	
58°					23° 47'·2	*39'·0*	23° 8'·2	*39'·1*	22° 29'·1	*39'·0*	21° 50'·1	*39'·1*
					24'·5		*23'·0*		*21'·5*		*20'·0*	
57°					23° 22'·7	*37'·5*	22° 45'·2	*37'·6*	22° 7'·6	*37'·5*	21° 30'·1	*37'·6*
					22'·6		*21'·1*		*19'·6*		*18'·1*	
56°			23° 36·'2	*36'·1*	23° 0'·1	*36'·0*	22° 24'·1	*36'·1*	21° 48'·0	*36'·0*	21° 12'·0	*36'·1*
			23'·4		*21'·8*		*20'·4*		*18'·8*		*17'·4*	
55°	23° 47'·4	*34'·6*	23° 12'·8	*34'·5*	22° 38'·3	*34'·6*	22° 3'·7	*34'·5*	21° 29'·2	*34'·6*	20° 54'·6	*34'·5*
	25'·6		*24'·1*		*22'·6*		*21'·1*		*19'·6*		*18'·1*	
54°	23° 21'·8	*33'·1*	22° 48'·7	*33'·0*	22° 15'·7	*33'·1*	21° 42'·6	*33'·0*	21° 9'·6	*33'·1*	20° 36'·5	*33'·0*
	26'·7		*25'·4*		*24'·2*		*22'·8*		*21'·4*		*20'·0*	
53°	22° 55'·1	*31'·8*	22° 23'·3	*31'·8*	21° 51'·5	*31'·7*	21° 19'·8	*31'·6*	20° 48'·2	*31'·7*	20° 16'·5	*31'·5*
	28'·0		*26'·9*		*25'·7*		*24'·5*		*23'·3*		*21'·8*	
52°	22° 27'·1	*30'·7*	21° 56'·4	*30'·6*	21° 25'·8	*30'·5*	20° 55'·3	*30'·4*	20° 24'·9	*30'·2*	19° 54'·7	*30'·*
							25'·2		*23'·9*		*22'·6*	
51°							20° 30'·1	*29'·1*	20° 1'·0	*28'·9*	19° 32'·1	*28'·7*
											21'·8	
50°											19° 10'·3	*27'·*
	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.	

To face Page 508.

I.

	3° W.		2° W.		1° W.		0° W.		1° E.		2° E.	Latitude.
40'·	20° 50'·9	*40'·6*	20° 10'·3									59°
	18'·9		*17'·4*									
39'·	20° 32'·0	*39'·1*	19° 52'·9									58°
	17'·0		*15'·5*									
37'·	20° 15'·0	*37'·6*	19° 37'·4									57°
	15'·1		*13'·6*									
36'·	19° 59'·9	*36'·1*	19° 23'·8	*36'·0*	18° 47'·8							56°
	14'·4		*12'·8*		*11'·4*							
34'·	19° 45'·5	*34'·5*	19° 11'·0	*34'·6*	18° 36'·4	*34'·5*	18° 1'·9					55°
	15'·1		*13'·6*		*12'·1*		*10'·6*					
33'·	19° 30'·4	*33'·0*	18° 57'·4	*33'·1*	18° 24'·3	*33'·0*	17° 51'·3					54°
	17'·0		*15'·5*		*13'·8*		*12'·1*					
31'·	19° 13'·4	*31'·5*	18° 41'·9	*31'·4*	18° 10'·5	*31'·3*	17° 39'·2	*31'·4*	17° 7'·8	*31'·3*	16° 36'·5	53°
	18'·8		*17'·2*		*15'·5*		*13'·8*		*12'·0*		*10'·0*	
30'·	18° 54'·6	*29'·9*	18° 24'·7	*29'·7*	17° 55'·0	*29'·6*	17° 25'·4	*29'·6*	16° 55'·8	*29'·3*	16° 26'·5	52°
	19'·6		*17'·9*		*16'·1*		*14'·3*		*12'·1*		*10'·1*	
28'·	18° 35'·0	*28'·2*	18° 6'·8	*27'·9*	17° 38'·9	*27'·8*	17° 11'·1	*27'·4*	16° 43'·7	*27'·3*	16° 16'·4	51°
	18'·8		*17'·1*									
26'·	18° 16'·2	*26'·5*	17° 49'·7									50°
	3° W.		2° W.		1° W.		0° W.		1° E.		2° E.	

BRITISH MUSEUM NATURAL HISTORY.

used as the basis of any calculation, the approximate assumption was never applied to an interval greater than half a degree.

The errors introduced were in all cases very small, and we assured ourselves that they were far less than those due to experiment or to the correction for secular change.

As the method was therefore legitimate, it was better to employ it when so many stations were involved. The absolute saving in labour was very great, and the calculations were more easily checked.

The preliminary calculations made in the selection of the formulæ for the isomagnetics were, for the most part, based directly on the formulæ themselves.

We think it better, however, to adhere to one method throughout this paper, and the figures here given are deduced from the Table. The agreement between observation and calculation is in some cases a little less close than it would otherwise have been, but the differences only amount to two or three tenths of a minute of arc in the case of the Declination, and are equally unimportant in the case of the other elements.

The evidence for the satisfactory character of the formula is as follows :—

(1.) The formula expresses with great accuracy the values of the Declinations at the Central Stations.

This is proved by the following Table :—

District.	Declinations at Central stations.		
	Mean value observed in district.	Calculated.	Difference.
I.	20° 58′·4	20° 59′·4	−1′·0
II.	20 7·9	20 4·9	+3·0
III.	18 51·8	18 51·3	+0·5
IV.	17 45·7	17 44·7	+1·0
V.	22 3·9	22 4·5	−0·6
VI.	20 46·0	20 45·4	+0·6
VII.	18 38·4	18 40·7	−2·3
VIII.	21 53·9	21 54·0	−0·1
IX.	19 35·5	19 34·1	+1·4

(2.) The formula expresses the general form of the district curves in the centre of the kingdom with great accuracy. There is some divergence in the North of Scotland and in the South-east of England.

In the following Table the points at which the isogonals calculated from the District Lines (Table II.) and from the formula respectively, cut given lines of latitude are compared. The longitudes of the points of intersection are given.

The lower number in each square is that given by the district curve, the upper is that calculated from the formula. The latter calculation was made direct, and also by means of Table III. The results were in due accord. In the following Table the numbers are those deduced from Table III.

LONGITUDES of the points of intersection with given Lines of Latitude of the Isogonals deduced from the District Lines and the Formula respectively.

Latitude.	23°.	22°.	21°.	20°.	19°.	18°.	17°.
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′
58·5		4 58 5 30	3 28 3 39	1 58 1 48			
57·5	7 5 7 45	5 31 5 54	3 57 4 4	2 23 2 13			
56·5	7 41 8 10	6 4 6 14	4 26 4 25	2 48 2 39			
55·5	8 18 8 20	6 36 6 31	4 54 4 50	3 12 3 7	1 30 1 25		
54·5	8 59 9 2	7 12 7 14	5 26 5 21	3 39 3 40	1 52 1 51	0 6 W. 0 9 E.	
53·5	9 45 9 46	7 53 7 53	6 2 6 1	4 11 4 13	2 19 2 20	0 27 0 20	
52·5	.. ..	8 41 8 40	6 45 6 42	4 50 4 47	2 53 2 56	0 55 0 49	1 4 E. 1 34 E.
51·5	.. ..	9 35 9 27	7 35 7 29	5 34 5 32	3 31 3 37	1 27 1 38	0 38 E. 0 49 E.
50·5	.. ..	.. ..	.. ..	.. ..	4 15 4 7	2 3 2 11	0 10 E. 0 4 E.

The relation between these two sets of figures is perhaps better illustrated by the isogonal curves shown in Map 1. The district curves are dotted. The calculated are drawn in continuous red lines.

The agreement in the centre of the kingdom is all that could be desired. The divergences in the North of Scotland are very large. Thus taking lat. 58° 30′ N., long. 7° W. as an example, the Declination as given by the district curves is 22° 48′·7 (Table II.) and as calculated 23° 20′·7 (Table III.), a difference of no less than 32′.

A glance at Map 1 shows that the district curves bend suddenly to the West in the North West of Scotland. A similar peculiarity was exhibited (though to a less extent) by the results of the 1886 survey ("1890 Memoir," Plate 2), and a comparison of the values of $d\delta/d\lambda$ in Table I of this Paper proves that the district curves are affected with some irregularity in Scotland. The four districts IV, III, II, and I, are on the Eastern side of the United Kingdom. The values of $d\delta/d\lambda$ are 25′·4, 30′·3, 35′·2 and 32′·5 for each of them respectively. They thus increase as we pass northwards until Scotland is reached, when a decrease follows. That the value 32′·5 is not incorrect is proved by the fact that it is nearly the mean of the two numbers obtained (viz., 30′·7 and 33′·9) when the Scotch stations were divided into two groups (*cf.* p. 504). On the other hand no such alternate increase and decrease was shown in the 1886 survey, and it is improbable that it really exists. On the whole, therefore, having brought the district and calculated curves into close agreement elsewhere, we thought it more probable that the large disturbances known to exist in Scotland affected the district lines, than that the formula suddenly ceased to be valid.

We have two *à posteriori* proofs of the correctness of this judgment.

(1) When reduced to the same epoch the calculated isogonals of the two surveys are in very good accord in Scotland.

(2) The Horizontal Disturbing Forces, the calculation of which depends upon the Declination, point in Scotland, as elsewhere, to the regions of greatest Vertical Force Disturbance the determination of which is independent of the Declination.

It is impossible that the latter condition should be fulfilled if the calculated Declinations were affected with errors amounting to half a degree.

Horizontal Force.

The observations on Horizontal Force were treated in exactly the same way as the Declinations.

The following table gives the positions of each of the central stations in the nine districts, together with the values of H at each, deduced from the weighted mean of all the stations in the district, and also the rates of change per degree of latitude and longitude in terms of metric units.

TABLE IV.

District.	Central station.		H'_0.	$x = \frac{dH'}{dl}$.	$y = \frac{dH'}{d\lambda}$.
	Lat. N.	Long. W.			
	° ′	° ′			
I.	56 38·2	4 21·5	1·6011	− 0·03817	− 0·00677
II.	55 23·9	3 23·7	1·6519	− 0·03290	− 0·00587
III.	53 24·2	2 5·9	1·7313	− 0·04042	− 0·00593
IV.	51 47·4	0 46·0	1·8070	− 0·04348	− 0·00635
V.	54 2·7	7 37·9	1·6761	− 0·04029	− 0·00802
VI.	53 30·5	5 35·2	1·7083	− 0·03801	− 0·00535
VII.	51 5·3	3 8·0	1·8206	− 0·04266	− 0·00757
VIII.	52 51·5	8 11·6	1·7197	− 0·03947	− 0·00578
IX.	51 41·9	4 32·6	1·7863	− 0·04137	− 0·00628

From these data the district lines were deduced by calculating the value of H at specified points in each district and taking the mean at points where the districts overlapped.

Details are given in the following Table :—

TABLE

Lat.	Longitude.					
	10° W.	9°.	8°.	7°.	6°.	5°.
58 30				(1) 1·5121	1·5188	1·5256
57 30			(1) 1·5435	1·5502	1·5570	1·5638
56 30			(1) 1·5816	1·5884	*1·5952* (2) *1·6004* 1·5978	*1·6020* *1·6063* 1·6042
55 30			(5) 1·6145	1·6225	(2) *1·6333* *1·6305* (5) 1·6319	1·6392
54 30		(5) 1·6468	1·6548	*1·6628* (6) *1·6630* 1·6629	(2) *1·6662* *1·6708* (5) *1·6684* 1·6685	*1·6721* *1·6737* 1·6729
53 30	(5) *1·6790* (8) *1·6840* 1·6815	*1·6871* *1·6897* 1·6884	*1·6951* *1·6955* 1·6953	*1·7031* (6) *1·7011* *1·7013* 1·7018	*1·7111* (5) *1·7064* *1·7071* (8) 1·7082	1·7118
52 30	(8) 1·7234	1·7292	1·7350	(6) *1·7391* *1·7408* (9) *1·7377* 1·7392	*1·7444* *1·7466* (8) *1·7440* 1·7450	*1·7498* *1·7503* 1·7501
51 30	(8) 1·7629	1·7687	1·7745	*1·7802* (9) *1·7791* 1·7797	*1·7860* (8) *1·7854* 1·7857	*1·7917* (7) *1·7889* 1·7903
50 30				(9) 1·8205	1·8268	*1·8330* (7) *1·8316* 1·8323
49 30						(7) 1·8742
	10° W.	9°.	8°.	7°.	6°.	5°.

V.

Longitude.							Lat.
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	
1·5324	1·5392	1·5459	1·5527 (1)				58° 30′
1·5706	1·5773	1·5841	1·5909 (1)				57 30
1·6087 *1·6121* 1·6104	*1·6155* *1·6180* 1·6168	*1·6223* *1·6239* 1·6231	*1·6290* (1) *1·6297* (2) 1·6294				56 30
1·6450	1·6509	1·6568	1·6626 (2)				55 30
1·6779 (3) *1·6757* *1·6791* (6) 1·6776	*1·6838* *1·6816* 1·6827	*1·6897* *1·6875* 1·6886	*1·6955* (2) *1·6935* 1·6945	1·6994 (3)			54 30
(3) *1·7161* *1·7171* (6) 1·7166	1·7220	1·7280	1·7339	1·7398 (3)			53 30
(3) *1·7565* *1·7551* (6) *1·7566* 1·7561	*1·7624* (4) *1·7620* *1·7629* (9) 1·7624	*1·7684* *1·7683* 1·7684	*1·7743* *1·7747* 1·7745	*1·7802* (3) *1·7810* 1·7806	1·7874	1·7937 (4)	52 30
1·7980 *1·7965* 1·7973	*1·8042* (9) (4) *1·8055* *1·8040* 1·8046	*1·8118* *1·8116* 1·8117	*1·8182* *1·8192* (7) 1·8187	1·8245	1·8309	1·8372 (4)	51 30
1·8393 *1·8391* 1·8392	*1·8456* (9) (4) *1·8489* *1·8467* 1·8471	*1·8553* *1·8543* 1·8548	*1·8616* *1·8618* (7) 1·8617	1·8680	1·8743	1·8807 (4)	50 30
1·8818	1·8894	1·8969	1·9045 (7)				49 30
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	

The terrestrial curves were calculated from the formulæ

$$c = 50^\circ{\cdot}066 + \tfrac{1}{3}\left\{77^\circ\,(1{\cdot}85 - \mathrm{H}) - 0^\circ{\cdot}42 \sin\,(1000^\circ\,\overline{\mathrm{H} - 1{\cdot}65})\right\},$$

$$l = -\left\{0{\cdot}14097 + \frac{53^\circ{\cdot}2 \backsim c}{120^\circ}\right\}(\lambda - 5^\circ) + c,$$

H being considered as a mere numeral.

From these, if H is given, c is known, and then the latitude in which the corresponding line of equal Horizontal Force cuts any given meridian of longitude is easily found from the second formula.

In like manner, if l and λ are given, H can be found by successive approximation, the convergence of the values being in general very rapid.

Table VI. contains the values of the Horizontal Forces given by these formulæ at the points where whole degrees of latitude and longitude intersect.

From this table we deduce the calculated values of H at the central stations, which are in sufficiently good accord with observation.

District.	Horizontal force at Central station.		Difference in terms of 0·0001.
	Mean of values observed in district.	Calculated.	
I.	1·6011	1·6020	− 9
II.	1·6519	1·6519	0
III.	1·7313	1·7313	0
IV.	1·8070	1·8068	+ 2
V	1·6761	1·6770	− 9
VI.	1·7083	1·7082	+ 1
VII.	1·8206	1·8211	− 5
VIII.	1·7197	1·7184	+13
IX.	1·7863	1·7854	+ 9

The Table on p. 515 gives a number of points on the district and terrestrial curves respectively. The upper number in each square corresponds to the terrestrial curve calculated from Table VI. The curves are exhibited on Map 2. The district curves are dotted. The terrestrial curves are drawn in continuous red lines.

BRITISH MUSEUM NATURAL HISTORY

Latitude.	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.
59°							1·4888	*82*	1·4970	*81*	1·5051
							425		*418*		*411*
58°							1·5313	*75*	1·5388	*74*	1·5462
							401		*393*		*386*
57°					1·5646	*68*	1·5714	*67*	1·5781	*67*	1·5848
					386		*379*		*373*		*366*
56°					1·6032	*61*	1·6093	*61*	1·6154	*60*	1·6214
					368		*365*		*361*		*357*
55°			1·6342	*58*	1·6400	*58*	1·6458	*57*	1·6515	*56*	1·6571
			368		*366*		*363*		*361*		*359*
54°	1·6653	*57*	1·6710	*56*	1·6766	*55*	1·6821	*55*	1·6876	*54*	1·6930
	377		*375*		*375*		*374*		*373*		*374*
53°	1·7030	*55*	1·7085	*56*	1·7141	*54*	1·7195	*54*	1·7249	*55*	1·7304
	380		*380*		*381*		*384*		*389*		*395*
52°	1·7410	*55*	1·7465	*57*	1·7522	*57*	1·7579	*59*	1·7638	*61*	1·7699
									413		*420*
51°									1·8051	*68*	1·8119
									426		*430*
50°									1·8477	*72*	1·8549
	10° W.		9° W.		8 W.		7° W.		6° W.		5° W.

To face Page 514.

	3° W.		2° W.		1° W.		0°.		1° E.		2°. E.	Latitude.
77	1·5207	*76*	1·5283									59°
	395		*386*									
69	1·5602	*67*	1·5669									58°
	372		*366*									
62	1·5974	*61*	1·6035									57°
	356		*352*									
57	1·6330	*57*	1·6387									56°
	350		*346*									
54	1·6680	*53*	1·6733	*53*	1·6786							55°
	356		*356*		*356*							
53	1·7036	*53*	1·7089	*53*	1·7142	*53*	1·7195					54°
	379		*385*		*392*		*400*					
57	1·7415	*59*	1·7474	*60*	1·7534	*61*	1·7595	*64*	1·7659	*65*	1·7724	53°
	411		*418*		*425*		*433*		*440*		*448*	
64	1·7826	*66*	1·7892	*67*	1·7959	*69*	1·8028	*71*	1·8099	*73*	1·8172	52°
	433		*438*		*444*		*448*		*452*		*455*	
71	1·8259	*71*	1·8330	*73*	1·8403	*73*	1·8476	*75*	1·8551	*76*	1·8627	51°
	434		*436*		*437*		*438*		*438*			
72	1·8693	*73*	1·8766	*74*	1·8840	*74*	1·8914	*75*	1·8989			50°
	3° W.		2° W.		1° W.		0°.		1° E.		2° E.	

BRITISH MUSEUM NATURAL HISTORY.

LATITUDES of the Points of Intersection with given Lines of Longitude, of Lines of equal Horizontal Force deduced from the District Lines and the Formula respectively.

Long.	1·85	1·80	1·75	1·70	1·65	1·60	1·55
	° ′	° ′	° ′	° ′	° ′	° ′	° ′
10° W.	..	..	51 46 51 50	53 5 53 4	54 24 54 14		
9° W.	..	..	51 55 51 58	53 14 53 13	54 34 54 25		
8° W.	..	..	52 4 52 7	53 23 53 23	54 44 54 37	56 5 55 56	57 21 57 20
7° W.	..	..	52 12 52 14	53 31 53 33	54 53 54 49	56 14 56 10	57 32 57 30
6° W.	..	51 7 51 9	52 21 52 23	53 40 53 42	55 2 55 0	56 25 56 26	57 43 57 41
5° W.	50 7 50 5	51 17 51 16	52 30 52 30	53 49 53 48	55 12 55 11	56 35 56 36	57 54 57 52
4° W.	50 17 50 15	51 27 51 26	52 39 52 39	53 57 53 56	55 21 55 21	56 45 56 46	58 5 58 2
3° W.	50 27 50 26	51 36 51 37	52 48 52 48	54 6 54 4	55 31 55 32	56 56 56 56	58 15 58 13
2° W.	50 37 50 37	51 45 51 46	52 56 52 57	54 15 54 13	55 40 55 42	57 6 57 6	58 26 58 24
1° W.	50 47 50 46	51 55 51 55	53 5 53 6	54 24 54 22	55 50 55 53	57 16 57 16	
0	50 57 50 55	52 4 52 3	53 14 53 15	54 33 54 29			
1° E.	51 7 51 4	52 14 52 13	53 23 53 24				
2° E.	51 17 51 12	52 23 52 21					

Inclination.

The Dip observations were treated like those on the Declination and Horizontal Force.

In the following Table the rates of change are expressed in terms of minutes of arc per degree of latitude and longitude respectively :—

Table VII.

District.	Central station.		θ'_0.	$x = \frac{d\theta'}{dl}$.	$y = \frac{d\theta'}{d\lambda}$.
	Lat. N.	Long. W.			
I.	56° 38′·2	4° 21′·5	70° 57′·3	34′5	6′·7
II.	55 23·9	3 23·7	70 9·3	31·9	6·5
III.	53 24·2	2 5·9	68 53·6	37·2	6·3
IV.	51 47·4	0 46·0	67 42·2	40·1	7·2
V.	54 2·7	7 37·9	69 52·6	35·4	8·2
VI.	53 30·5	5 35·2	69 19·5	36·1	6·2
VII.	51 5·3	3 8·0	67 32·1	41·4	8·1
VIII.	52 51·5	8 11·6	69 11·9	40·0	6·8
IX.	51 41·9	4 32·6	68 5·2	38·7	6·6

From these data the district curves were calculated as before.

Details are given in Table VIII. (p. 518).

The terrestrial curves were at first calculated for the whole kingdom from the formulæ

$$p = l - 50^\circ{\cdot}855 + 0{\cdot}1833\,(\lambda - 4)$$
$$= 1{\cdot}5\,(\theta - 67{\cdot}5) + 0{\cdot}055\,(\theta - 67{\cdot}5)^2,$$

where θ is the Dip expressed in degrees and fractions of a degree.

If θ is given, the latitude at which the corresponding isoclinal cuts any particular line of longitude can easily be found.

If θ is required, when l and λ are given, p is first found, and then by solving the quadratic we get

$$\theta = 53^\circ{\cdot}864 + 13^\circ{\cdot}636\,\sqrt{(1 + p/10{\cdot}227)}.$$

This formula agrees well with the district lines if the Dip is less than 71°, after that the discrepancy increases till at lat. 58° 30′, long. 7°, it amounts to 9′·6.

This divergence between the general formula and the district lines affects only places north of the central station of our most northerly district (I), where on the one hand we have only the district lines of that region to rely upon, and on the other hand the accuracy of the lines is not checked by their overlapping those in a neighbouring district. It is, therefore, a very doubtful question whether we should trust the general formula or the district lines.

The calculations were first made with the general formula as above given, but the differences between the calculated and observed values of the Dip at the different stations in the extreme north were so great that we were led to believe that the district lines were a better representation of the state of the district.

There was other evidence of their trustworthiness, as at lat. 56° 30′ (see Table VIII.) where Districts I and II overlap the Dips deduced from the lines for District I never differ by more than 1′ from the mean of the two.

On the whole, therefore, we decided to bring the formula into closer agreement with the district lines.

For values of θ in the above formulæ $> 71°$ we took the true dip (θ') to be given by the formula

$$\theta' = (11\,\theta - 71)/10.$$

In Table IX. (p. 520) the Dips calculated by these formulæ for the intersections of whole degrees of latitude and longitude are exhibited, as in the case of the other elements.

The discontinuity due to the above correction introduces into the part of the Table which refers to the North of Scotland some irregularities which we have not smoothed out.

TABLE

Lat.	Longitude.					
	10° W.	9°.	8°.	7°.	6°.	5°.
° ′	° ′	° ′	° ′	° ′	° ′	° ′
58 30				(1) 72 19·4	72 12·7	72 6·0
57 30			(1) 71 51·6	71 44·9	71 38·2	71 31·5
56 30			(1) 71 17·1	71 10·4	*71 3·7* (2) *71 1·4* 71 2·6	*70 57·0* *70 54·9* 70 56·0
55 30			(5) 70 47·1	70 38·9	(2) *70 29·5* *70 30·7* (5) 70 30·1	70 23·0
54 30		(5) 70 20·0	70 11·7	*70 3·5* (6) *70 4·0* 70 3·8	(2) *69 57·7* *69 55·3* (5) *69 57·9* 69 57·0	*69 51·1* *69 51·7* 69 51·4
53 30	(5) *69 52·8* (8) *69 49·9* 69 51·4	*69 44·5* *69 43·0* 69 43·8	*69 36·3* *69 36·2* 69 36·3	*69 28·1* (6) *69 27·9* *69 29·3* 69 28·4	*69 19·9* (5) *69 21·8* *69 22·5* (8) 69 21·4	69 15·6
52 30	(8) 69 9·9	69 3·0	68 56·2	(6) *68 51·8* *68 49·3* (9) *68 52·5* 68 51·2	*68 45·7* *68 42·5* (8) *68 45·9* 68 44·7	*68 39·5* *68 39·2* 68 39·4
51 30	(8) 68 29·9	68 23·0	68 16·2	*68 9·3* (9) *68 13·9* 68 11·6	*68 2·5* (8) *68 7·2* 68 4·9	*68 0·6* (7) *68 4·2* 68 2·4
50 30				(9) 67 35·2	67 28·6	*67 21·9* (7) *67 22·8* 67 22·4
49 30						(7) 66 41·5
Lat.	° 10 W.	9°.	8°.	7°.	6°.	5°.

VIII.

Longitude.							Lat.
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
71 59·2	71 52·5	71 45·8	71 39·1 (1)				58 30
71 24·7	71 18·0	71 11·3	71 4·6 (1)				57 30
70 50·2 *70 48·4* 70 49·3	*70 43·5* *70 41·8* 70 42·7	*70 36·8* *70 35·3* 70 36·1	*70 30·1* (1) *70 28·8* (2) 70 29·5				56 30
70 16·5	70 9·9	70 3·4	69 56·9 (2)				55 30
69 44·6 (3) *69 46·4* *69 45·5* (6) 69 45·5	*69 38·1* *69 40·1* 69 39·1	*69 31·5* *69 33·8* 69 32·7	*69 25·0* (2) *69 27·4* 69 26·2	69 21·1 (3)			54 30
(3) *69 9·2* *69 9·4* (6) 69 9·3	69 2·9	68 56·6	68 50·3	68 43·9 (3)			53 30
68 33·3 (6) (3) *68 32·0* *68 32·6* 68 32·6	*68 25·7* (4) *68 26·6* *68 26·0* (9) 68 26·1	*68 19·4* *68 19·5* 68 19·5	*68 13·1* *68 12·3* 68 12·7	*68 6·7* (3) *68 5·1* 68 5·9	67 58·0	67 50·8 (4)	52 30
67 53·9 *67 56·1* 67 55·0	*67 47·3* (9) (4) *67 46·6* *67 48·0* 67 47·3	*67 39·4* *67 40·0* 67 39·7	*67 32·2* *67 31·9* (7) 67 32·1	67 25·1	67 17·9	67 10·7 (4)	51 30
67 15·3 *67 14·7* 67 15·0	*67 8·7* (9) (4) *67 6·5* *67 6·7* 67 7·3	*66 59·3* *66 58·6* 66 59·0	*66 52·2* *66 50·5* (7) 66 51·4	66 45·0	66 37·8	66 30·7 (4)	50 30
66 33·4	66 25·3	66 17·2	66 9·2 (7)				
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	Lat.

In the next Table we compare the Dips at the Central Stations, with the calculated values obtained from Table IX.

DIPS at Central Stations.

District.	Mean value observed in district.	Calculated.	Difference.
	° ′	° ′	′
I.	70 57·3	70 58·0	− 0·7
II.	70 9·3	70 11·3	− 2·0
III.	68 53·6	68 53·6	0·0
IV.	67 42·2	67 43·5	− 1·3
V.	69 52·6	69 51·9	+ 0·7
VI.	69 19·5	69 20·2	− 0·7
VII.	67 32·1	67 32·8	− 0·7
VIII.	69 11·9	69 14·1	− 2·2
IX.	68 5·2	68 6·7	− 1·5

The differences here are for the most part negative, and, in accord with this, the Table on p. 521 shows that the calculated isoclinals, on the whole, run a little below the district curves.

A better result would be obtained for the central stations if a formula were adopted which diminished the calculated Dips by 0′·9. Inasmuch as, on the average, the Dip alters by 1° for a change of 1° 40′ in latitude, this would move the isoclinals $0·9 \times 100/60 = 1·5$ minutes of latitude further north. This, however, would place them as much to the north of the district lines as they are now to the south of them, and would make the discontinuity in the North of Scotland more conspicuous. On the whole the formula seems to give as good a representation of the facts as the inherent difficulties of the case will allow.

In the Table on p. 521 we give the data required in order to draw the isoclinals deduced from Tables VIII. and IX. respectively.

The lower number in each square is, as before, that given by the district curve, and the upper is that calculated from the formula by the aid of Table IX.

The curves themselves are exhibited in Map 3. The district curves are dotted, the terrestrial curves are drawn in continuous red lines.

BRITISH MUSEUM
NATURAL HISTORY

Latitude.	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.
59°							72° 33'·2	6'·0	72° 27'·2	6·0	72° 21'·2
							32'·8		32'·9		33'·0
58°					72° 6'·5	6'·1	72° 0'·4	6'·1	71° 54'·3	6'·1	71° 48'·2
					33'·5		33'·7		34'·0		34'·1
57°					71° 33'·0	6'·3	71° 26'·7	6'·4	71° 20'·3	6'·2	71° 14'·1
					34'·4		34'·0		33'·5		33'·2
56°					70° 58'·6	5 ·9	70° 52'·7	5'·9	70° 46'·8	5'·9	70° 40'·9
					32'·4		32'·6		32'·8		33'·0
55°			70° 32'·2	6'·0	70° 26' 2	6'·1	70° 20'·1	6'·1	70° 14'·0	6'·1	70° 7'·9
			33'·3		33'·5		33'·7		33'·9		34' 1
54°	70° 5'·2	6'·3	69° 58'·9	6'·2	69° 52'·7	6'·3	69° 46'·4	6'·3	69° 40'·1	6'·3	69° 33'·8
	34'·3		34'·4		34'·7		34'·9		35'·1		35'·4
53°	69° 30'·9	6'·4	69° 24'·5	6'·5	69° 18'·0	6'·5	69° 11'·5	6'·5	69° 5'·0	6'·6	68° 58'·4
	35'·5		35'·8		36'·1		36' 3		36'·6		36'·9
52°	68° 55'·4	6'·7	68° 48'·7	6'·8	68° 41'·9	6'·7	68° 35'·2	6'·8	68° 28'·4	6'·9	68° 21'·5
									38'·2		38'·5
51°									67° 50'·2	7'·2	67° 43'·0
									39'·9		40'·3
50°									67° 10'·3	7'·6	67° 2'·7
	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.

To face Page 520.

3° W.		2° W.		1° W.		0°.		1° E.		2° E.	Latitude.
72° 9′·2											59°
33′·4											
71° 35′·8	*6′·2*	71° 29′·6									58°
34′·5		*34′·2*									
71° 1′·3	*5′·9*	70° 55′·4									57°
32′·4		*32′·5*									
70° 28′ 9	*6′·0*	70° 22′·9	*6′·0*	70° 16′·0							56°
33′·4		*33′·6*		*33′·9*							
69° 55′·5	*6′·2*	69° 49′·3	*6′·3*	69° 43′·9							55°
34′·6		*34′·8*		*35′·0*							
9° 20′·9	*6′·4*	69° 14′·5	*6′·5*	69° 8′·0	*6′·6*	69° 1′·4					54°
35′·9		*36′·2*		*36′·5*		*36′·7*					
8° 45′·0	*6′·7*	68° 38′·3	*6′·8*	68° 31·′5	*6′·8*	68° 24′·7	*6′·9*	68° 17′·8			53°
37′·4		*37′·7*		*38′·0*		*38′·4*		*38′·7*			
68° 7′·6	*7′·0*	68° 0′·6	*7′·1*	67° 53′·5	*7′·2*	67° 46′·3	*7′·2*	67° 39′·1	*7′·3*	67° 31′·8	52°
39′·2		*39′·5*		*39′·8*		*40′·1*		*40′·5*		*40′·9*	
7° 28′·4	*7′·3*	67° 21′·1	*7′·4*	67° 13′·7	*7·5*	67° 6′·2	*7′·6*	66° 58′·6	*7′·7*	66° 50′·9	51°
41′·0		*41′·5*		*41′·9*		*42·′3*		*42′·8*			
6° 47′·4	*7′·8*	66° 39′·6	*7′·8*	66° 31′·8	*7′·9*	66° 23′·9	*8′·1*	66° 15′·8			50°
3° W.		2° W.		1° W.		0° W.		1° E.		2° E.	

BRITISH MUSEUM NATURAL HISTORY

LATITUDES of the points of intersection with given lines of Longitude of the Isoclinals deduced from the District Lines and the Formulæ respectively.

Long.	67°.	68°.	69°.	70°.	71°.	72°.
°	° ′	° ′	° ′	° ′	° ′	° ′
10 W.			52 8 52 15	53 51 53 44		
9			52 19 52 25	54 2 53 57		
8			52 30 52 36	54 13 54 10		
7			52 41 52 44	54 24 54 24	56 13 56 10	57 59 57 56
6			52 52 52 55	54 35 54 35	56 24 56 25	58 10 58 8
5	49 56 49 57	51 26 51 26	53 3 53 4	54 46 54 46	56 35 56 37	58 21 58 20
4	50 7 50 8	51 37 51 38	53 14 53 15	54 57 54 58	56 46 56 48	58 32 58 31
3	50 18 50 20	51 48 51 50	53 25 53 25	55 8 55 11	56 57 56 59	58 43 58 43
2	50 29 50 31	51 59 52 1	53 36 53 36	55 19 55 23	57 8 57 11	
1	50 40 50 43	52 10 52 11	53 47 53 46	55 30 55 36		
0	50 51 50 52	52 21 52 21	53 58 53 56			
1° E.	51 2 51 3	52 32 52 33				
2°	51 13 51 14					

Local and Regional Disturbances deduced from the 1891 Survey.

Having thus found the terrestrial isomagnetics for January 1, 1891, from the observations made in 1890 and 1891, we are able to calculate the Disturbing Forces at the places at which observations were made in those years. This was done exactly as described in our previous Memoir (p. 260), and the results aided us in our choice of stations for the summer of 1892. The Disturbing Forces were then calculated at these places also. The results are entered in the first three columns of Table XXV., p. 590, together with the corresponding numbers obtained from the first survey exactly as they are given in our 1886 Memoir. The Horizontal Component of the Disturbing Force is indicated by F_1, the angle which it makes with the geographical meridian measured positive from north to west is ϕ_1, and the Vertical Component of the Disturbing Force is V_1. These furnish the data for a map of the magnetic disturbances of the British Isles, obtained in the same manner as in our earlier survey, but based upon observations made at a much larger number of stations, viz., 677 as against 205, of which, too, nearly all were different from those at which we had previously observed. It is, therefore, important to determine whether the general result of this new and independent investigation confirms the conclusions drawn from our earlier work.

If the comparison is to be made without introducing the coefficient of secular change, it can best be carried out by determining whether the two surveys are in agreement as to the loci of attraction on the north pole of the needle.

In Plate 14 of our "1886 Memoir," the districts within which we thought that the main loci of attraction probably lie were indicated by shading. Eight such regions were shown, which may be described as those of—

(1) The Caledonian Canal; (2) Skye and Mull; (3) the Scotch Coal Field; (4) Antrim; (5) Connemara; (6) North Wales; (7) the Palæozoic Ridge from London to Wexford, with a branch from Reading to Chichester; (8) a line through Lincolnshire and Yorkshire from the Wash to Cumberland.

In addition to these, two peaks or centres of attraction are indicated (α) at Kells in Ireland and (β) near Melton Mowbray.

We have, therefore, prepared Map No. 4, which proves conclusively that the two surveys agree exactly as to the main loci of disturbance. All the results represented in the map depend on the second (1891) survey only. A few of the stations are the same as those at which we observed in the 1886 survey, but this is because (for reasons given below) the observations have been repeated. The figures give the Vertical Disturbing Forces, *i.e.*, the excess of the observed over the calculated values, in terms of 0·0001 metric or 0·00001 C.G.S. units. Positive forces, *i.e.*, downward attractions on the north pole, are indicated by red, negative forces by blue, figures. The arrows point in the directions of the Horizontal Components of the Disturbing Forces.

The map proves that, in the centre of each of the regions we previously marked out, the boundaries of which are shown by red lines, is a ridge or locus of high vertical force, bordered on each side by districts of low vertical force (valleys), and that the Horizontal Forces point from the valleys to the ridge lines.

As this is the only fact on which we are at present dwelling, the Horizontal Forces are not shown at the stations on the ridge lines. They will become important when we come to details. For the moment it is sufficient to insist that there are two independent tests of the existence of a ridge line, viz., high Vertical Force over it, and Horizontal Disturbing Forces directed from each side towards it ; and that these two conditions are both satisfied with regard to the same districts by two perfectly independent surveys taken five years apart.

When it is remembered that a Horizontal Disturbing Force of 0·5 per cent. of the earth's horizontal field is fairly large, the result affords a satisfactory confirmation of the validity of methods of calculating the normal undisturbed forces, from which the Disturbing Forces are in turn deduced. The Vertical Force Disturbance is in general negative at the stations (joined by blue lines), whence the Horizontal Forces point to the central attractive regions. In some cases it is positive, but it is then less than at neighbouring stations which are more directly over the ridge line.

Sometimes (as at places in Antrim) the Vertical Force is less than its calculated value within the attractive region, but the negative disturbances in the surrounding magnetic "valleys" are then correspondingly large.

In a few cases the Horizontal Disturbing Forces are so small that the directions in which they point are quite uncertain. Sometimes also—as at Pontefract—the station lies in the valley between two ridge lines, and points away from that the existence of which the map is intended to demonstrate. At all such stations the arrows have been omitted.

The only district in which our previous conclusions appear not to be in exact accord with the facts is near the Hebrides. We formerly inclined to the view that a ridge line ran up the Minch. Our recent observations seem to make it more probable that a ridge line crosses it from Skye. The full discussion of the point must, however, be postponed to a later section of this memoir.

SECULAR CHANGE BETWEEN 1886 AND 1891.

Having thus proved that the results of the new survey, when referred to the terrestrial lines deduced from it for the epoch 1891·0, confirm the conclusions as to the ridge lines which we had drawn from our earlier work, we must next combine the two surveys by reducing them to a common epoch.

This operation is not only necessary if the two surveys are to be treated as one, but it affords a means of testing the amount of error which may attach to the process of calculating the district and terrestrial lines. The present is the first occasion on which two such detailed investigations of the magnetic peculiarities of the same district have been made at so short an interval of time, and, therefore, affords a good opportunity for estimating the accuracy of the methods.

For this purpose the secular change in different districts must be determined independently of the terrestrial lines.

In choosing a common epoch we have been influenced by the fact that as the number of stations in the 1886 survey is comparatively small, a great saving of labour is effected if we reduce the 1886 survey to the epoch 1891·0, instead of choosing an intermediate date, which would have involved applying corrections to all the results obtained in both surveys. The systematic differences (if any exist) will be the same in either case, and the more laborious method has, therefore, no counterbalancing advantage to recommend it.

It has, therefore, been necessary to determine the secular change between 1886·0 and 1891·0 as accurately as possible.

Three sets of data have been utilized for this purpose, which we now proceed to discuss in detail.

(1.) *Secular Change from Central Stations.*

The central stations in the nine districts from which the district lines were determined differ but little in position in the two surveys. The small corrections necessary to transfer the values of the elements obtained at the central stations of the 1886 survey to the positions of the central stations in 1891 cannot introduce important errors. Hence the secular change can be accurately determined at these nine points from the results of observation alone.

The data thus obtained are summed up below.

Tables VIII. to X. ("1890 Memoir") are used in calculating the changes in the magnetic elements corresponding to the slight alterations in the positions of the central stations.

Table X.

No. of district.	Declination in 1886 at Central station used in 1886.	Declination in 1886 at Central station used in 1891.	Declination in 1891 at Central station used in 1891.	Secular change 1886·0 to 1891·0.
I.	21° 38′·8	21° 37′·6	20° 58′·4	− 39′·2
II.	20 55·6	20 44·1	20 7·9	− 36·2
III.	19 39·0	19 27·4	18 51·8	− 35·6
IV.	18 6·6	18 20·8	17 45·7	− 35·1
V.	22 41·3	22 42·1	22 3·9	− 38·2
VI.	21 25·6	21 21·9	20 46·0	− 35·9
VII.	19 6·2	19 15·5	18 38·4	− 37·1
VIII.	22 35·0	22 31·7	21 53·9	− 37·8
IX.	20 19·7	20 9·5	19 35·5	− 34·0

TABLE XI.

No. of district.	H in 1886 at Central station used in 1886.	H in 1886 at Central station used in 1891.	H in 1891 at Central station used in 1891.	Secular change 1886·0 to 1891·0.
I.	1·5580	1·5883	1·6011	+ ·0128
II.	1·6363	1·6402	1·6519	117
III.	1·7164	1·7198	1·7313	115
IV.	1·7970	1·7942	1·8070	128
V.	1·6650	1·6650	1·6761	111
VI.	1·6979	1·6977	1·7083	106
VII.	1·8212	1·8091	1·8206	115
VIII.	1·7053	1·7090	1·7197	107
IX.	1·7694	1·7761	1·7863	102

TABLE XII.

No. of district.	Dip in 1886 at Central station used in 1886.	Dip in 1886 at Central station used in 1891.	Dip in 1891 at Central station used in 1891.	Secular change 1886·0 to 1891·0.
I.	71° 8′·0	71° 2′·9	70° 57′·3	−5′·6
II.	70 19·6	70 15·5	70 9·3	−6·2
III.	69 3·0	68 59·2	68 53·6	−5·6
IV.	67 45·6	67 49·1	67 42·2	−6·9
V.	69 59·8	70 0·3	69 52·6	−7·7
VI.	69 24·8	69 26·1	69 19·5	−6·6
VII.	67 41·2	67 39·1	67 32·1	−7·0
VIII.	69 24·3	69 20·8	69 11·9	−8·9
IX.	68 18·2	68 11·6	68 5·2	−6·4

(2.) *Secular Change from Repeat Stations.*

As all the central stations lie at some distance from the coast, it was desirable that the evidence deduced from them should be reinforced by observations taken near the borders of the area we were studying.

In 1892, therefore, observations were made at 26 stations, which had been included in the earlier survey. These were not scattered uniformly all over the country, but were divided into small groups near the coast. The mean value of the secular changes observed at each group of stations was assigned to the position defined by the mean of their latitudes and longitudes.

In the following table the groups are lettered from A to G. The secular change is taken not from the observations reduced to January 1, 1886 and 1891 respectively, but over the whole interval which elapsed between the two sets of observations at the same station. The requisite data are given in the detailed accounts of the observations at the several stations in this paper and in the "1890 Memoir."

From these the secular change for five years is calculated on the hypothesis that it has been constant during the interval in question.

Table XIII.

Group.	Stations.	Interval in years.	Secular change in five years in			Mean secular change in five years in			Mean Latitude and Longitude.
			Declination.	Dip.	Horizontal force.	Declination.	Dip.	Horizontal force.	
			′	′		′	′		° ′
A	Lairg	6·94	−34·6	− 3·0	+·0060	−38·0	−4·5	+·0089	58 15 3 45
	Golspie	6·96	−37·6	− 3·1	85				
	Thurso	6·99	−41·5	− 4·9	95				
	Wick	6·99	−38·4	− 6·9	115				
B	Kyle Akin	7·88	−42·4	− 3·3	79	−36·8	−3·6	83	57 23 5 52
	Gairloch	7·89	−26·6	− 4·1	57				
	Soa	7·91	−41·3	− 3·4	113				
C	Mablethorpe	6·27	−34·5	− 3·1	89	−31·6	−5·5	88	53 19 0 20
	Lincoln	4·35	−28·6	− 6·7	76				
	Gainsborough	4·93	−31·6	− 6·6	98				
D	Oxford	6·30	−33·4	− 4·4	34	−32·8	−4·5	67	51 12 0 34
	St. Leonards	5·74	−28·8	− 5·1	80				
	Salisbury	6·00	−33·4	− 5·3	56				
	Tunbridge Wells	4·59	−35·5	− 3·1	96				
E	Armagh	4·86	−40·4	− 5·0	139	−40·9	−5·3	116	54 14 7 43
	Enniskillen	4·78	−42·9	− 6·4	127				
	Sligo	5·09	−38·8	− 7·4	101				
	Carrick-on-Shannon	5·09	−41·5	− 2·3	97				
F	Swansea	5·97	−39·0	− 6·3	104	−38·0	−6·1	107	51 36 4 2
	Cardiff	5·96	−34·3	− 6·1	119				
	Milford	4·81	−40·8	− 5·9	97				
G	Charleville	4·83	−35·1	− 8·7	151	−40·5	−7·5	112	52 0 9 30
	Killarney	4·81	−38·9	− 6·6	115				
	Bantry	4·81	−40·7	−10·2	120				
	Valentia	4·00	−47·3	− 4·5	60				

The differences between these results are certainly in some cases much larger than can be accounted for by a mere accumulation of the errors of experiment. The results obtained in the two surveys at Spalding were so obviously discrepant that we have not used them in the calculation of the secular change.

At Lairg, Gairloch, and Valentia the earlier and later observations were made at different places, which may account for the results at these stations being abnormal. In the North of Scotland they are elsewhere as good as the nature of the ground would allow. At other places we can only account for the irregularities by slight differences in the positions of the stations or by real changes in the Disturbing Forces.

(3.) *Secular Change from Magnetic Observatories.*

The third group of data at our disposal for the determination of the secular change is furnished by the magnetic observatories.

There are now five of these in the United Kingdom, viz.: Greenwich, Kew, Stonyhurst, Valentia, and Falmouth.

Observations were not made regularly at the two last till after 1886, so that they do not provide a measure of the secular change from 1886–91.

As Greenwich and Kew are very near together, and as the final results of the Greenwich observations for 1891 were not published at the end of 1892, when the secular change was being calculated, we have depended only on Kew for the south of England, and on Stonyhurst for the north.

The data for Stonyhurst were kindly supplied to us by the Rev. W. Sidgreaves, and are given below, together with those for Kew.

Table of Secular Change from January, 1886–91, at Kew and Stonyhurst.

	Year.	Declination.	Dip.	Horizontal force.
Kew	1886	18° 16′·3	66° 37′·4	1·8093
	1891	17 45·7	67 31·8	1·8184
		− 30·6	− 5·6	91
Stonyhurst . .	1886	19 42·0	69 12·5	1·7002
	1891	19 9·7	69 6·9	1·7072
		− 32·3	− 5·6	70

Having thus collected all the data which seemed likely to be useful, we prepared a table of the secular change at the intersection of lines corresponding to whole degrees of latitude and longitude, which give a tolerably regular variation of the change over the whole country, and also agree as nearly as may be with the results of observation as deduced from the central stations, repeat stations, and observatories.

This table is given below. In each square corresponding to a given degree of latitude and longitude is the secular change for five years of the Declination, Dip, and Horizontal Force. Signs are omitted. Forces are expressed in terms of 0·0001 metric or 0·00001 C.G.S. unit, Declinations and Dips in minutes of arc.

TABLE

Lat. N.	Longitude.					
	10° W.	9°.	8°.	7°.	6°.	5°.
° 59				42·3 10·8 5·0	41·4 106 4·8	40·6 103 4·6
58			42·1 111 5·4	41·3 108 5·2	40·4 106 5·0	39·6 103 4·9
57			41·2 112 5·8	40·4 109 5·6	39·5 107 5·4	38·7 104 5·3
56		41·3 114 6·4	40·4 112 6·2	39·6 109 6·0	38·7 107 5·8	37·9 104 5·7
55	41·4 118 7·1	40·6 115 6.8	39·7 113 6·5	38·9 110 6·3	38·0 108 6·1	37·2 105 6·0
54	40·8 119 7·4	40·0 116 7·1	39·1 114 6·8	38·3 111 6·6	37·4 109 6·4	36·6 106 6·3
53	40·3 120 7·7	39·5 117 7·4	38·6 115 7·1	37·8 112 6·9	36·9 110 6·7	36·1 107 6·6
52	39·8 122 8·0	39·0 119 7·7	38·1 117 7·4	37·3 114 7·2	36·4 112 7·0	35·6 109 6·9
51				36·8 118 7·5	35·9 116 7·3	35·1 113 7·2
50						34·6 119 7·5
	10° W.	9°.	8°.	7°.	6°.	5°.

XIV.

Longitude.							Lat. N.
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	
39·7 101 4·5	38·9 98 4·3	38·0 96 4·1	37·2 93 4·0				° 59
38·7 101 4·7	37·9 98 4·5	37·0 96 4·4	36·2 93 4·2				58
37·8 102 5·1	37·0 99 4·9	36·1 97 4·8	35·3 94 4·6				57
37·0 102 5·5	36·2 99 5·3	35·3 97 5·2	34·5 94 5·0				56
36·3 103 5·8	35·5 100 5·6	34·6 98 5·5	33·8 95 5·3	32·9 93 5·2			55
35·7 104 6·1	34·9 101 5·9	34·0 99 5·8	33·2 96 5·6	32·3 94 5·5			54
35 2 105 6·4	34·4 102 6·2	33·5 100 6·1	32·7 97 5·9	31·8 95 5·8	31·0 92 5·6	30·1 90 5·5	53
34·7 107 6·7	33·9 104 6·5	33·0 102 6·4	32·2 99 6·2	31·3 97 6·1	30·5 94 5·9	29·6 92 5·8	52
34·2 111 7·0	33·4 108 6·8	32·5 106 6·7	31·7 103 6·5	30·8 101 6·4	30·0 98 6·2	29·1 96 6·1	51
33·7 117 7·3	32·9 114 7·1	32·0 112 7·0	31·2 109 6·8	30·3 107 6·7			50
4°.	3°.	2°.	1° W.	0°.	1° E.	2°.	

The agreement between these assumed rates of secular change and observation is illustrated in the next table.

We have distributed the results obtained from the central stations (indicated by C.S. I., &c.), from the groups of repeat stations, and from Kew and Stonyhurst into eight secondary groups, according to their geographical positions. In two cases a group consists of only one central station. The observed secular changes taken from Tables X.–XIII. are compared with the calculated values deduced from Table XIV.

It will be seen that the means of the observed and calculated results are in fair accord in each group, and that the means of the means are practically identical.

Hence the secular changes deduced from Table XIV. do, on the average, agree with experiment, and this agreement is not due to serious errors in different parts of the country neutralizing each other, as the differences between the mean results of calculation and experiment are small in all districts.

SECULAR CHANGE, 1886–91.

	Latitude.	Longitude.	Declination.		Dip.		Horizontal force.	
			Observed.	Table.	Observed.	Table.	Observed.	Table.
Group A	58° 15′	3° 45′	−38′·0	−38′·7	−4′·5	−4′·6	+0·0089	+0·0100
Group B	57 23	5 52	−36·8	−39·8	−3·6	−5·2	83	106
C.S. I.	56 38	4 22	−39·2	−37·9	−5·6	−5·3	128	103
Mean	57 25	4 40	−38·0	−38·8	−4·6	−5·0	100	103
C.S. II.	55 24	3 24	−36·2	−36·1	−6·2	−5·6	117	101
Group E	54 14	7 43	−40·9	−39·0	−5·3	−6·7	116	113
C.S. V.	54 3	7 38	−38·2	−38·8	−7·7	−6·7	111	113
Mean	54 8	7 40	−39·5	−38·9	−6·5	−6·7	114	113
C.S. VI.	53 31	5 35	−35·9	−36·9	−6·6	−6·5	106	109
Stonyhurst	53 51	2 28	−32·3	−34·4	−5·6	−5·8	70	100
C.S. III.	53 24	2 6	−35·6	−33·7	−5·6	−6·1	115	100
Group C	53 19	0 20	−31·6	−32·3	−5·5	−5·7	88	95
Mean	53 31	1 58	−33·2	−33·5	−5·6	−5·9	91	98
C.S. VIII.	52 52	8 12	−37·8	−38·8	−8·9	−7·2	107	116
Group G	52 0	9 30	−40·5	−39·4	−7·5	−7·8	112	120
Mean	52 26	8 51	−39·2	−39·1	−8·2	−7·5	110	118
C.S. IX	51 42	4 33	−34·0	−34·9	−6·4	−6·9	102	110
Group F	51 36	4 2	−38·0	−34·5	−6·1	−6·8	107	109
C.S. VII.	51 5	3 8	−37·1	−33·5	−7·0	−6·8	115	108
Mean	51 28	3 54	−36·4	−34·3	−6·5	−6·8	108	109
C.S. IV.	51 47	0 46	−35·1	−31·9	−6·9	−6·3	128	101
Kew	51 28	0 19	−30·6	−31·3	−5·6	−6·3	91	100
Group D	51 12	0 34	−32·8	−31·4	−4·5	−6·4	67	102
Mean	51 29	0 33	−32·8	−31·5	−5·7	−6·3	95	101
Mean of means			−36·4	−36·1	−6·2	−6·3	105	106

It is interesting to compare this table of the total secular change between the years 1886–91 with the table of rates of annual change given in our previous "Memoir" (p. 325), but it is hardly worth while to make the comparison at all the points of intersection of whole degrees of latitude and longitude.

We have therefore prepared the following tables. In the first (Table XV.) a comparison is instituted at five points on longitude 4° W., which is nearly the central line of the United Kingdom. The first of the two numbers given for each element at each place is the annual secular change, taken from Table XII., p. 325, in our "1890 Memoir." The second or lower number is obtained by dividing the corresponding quantity in Table XIV. by five.

In Table XVI. a similar comparison is made at points on the same lines of latitude near the boundaries of the area of the survey.

Table XV.

Latitude.	Longitude 4°.		
	Declination.	Dip.	Horizontal force (metric unit).
59°	8'·4 7·9	1'·0 0·9	0·0016 0·0020
57	8·0 7·6	1·2 1·0	0·0018 0·0020
55	7·6 7·3	1·4 1·2	0·0019 0·0021
53	7·2 7·0	1·6 1·3	0·0020 0·0021
51	6·8 6·8	1·8 1·4	0·0020 0·0022

TABLE XVI.

Latitude.	Longitude.	Declination.	Dip.	Horizontal force (metric unit).
°	°	′	′	
59	7	8·9 8·5	1·1 1·0	0·0017 0·0022
	2	8·1 7·6	1·0 0·8	0·0016 0·0019
57	7	8·5 8·1	1·3 1·1	0·0019 0·0022
	2	7·7 7·2	1·2 1·0	0·0018 0·0019
55	9	8·4 8·1	1·6 1·4	0·0021 0·0023
	2	7·3 6·9	1·3 1·1	0·0019 0·0020
53	10	8·1 8·1	1·8 1·5	0·0022 0·0024
	1 E.	6·5 6·2	1·4 1·1	0·0019 0·0018
51	5	7·0 7·0	1·8 1·4	0·0021 0·0023
	2 E.	5·9 5·8	1·6 1·2	0·0018 0·0019

These tables are consistent with the view that the rate of secular change is diminishing in the case of the Declination and Dip, and increasing in the case of the Horizontal Force.

We are not inclined to insist too strongly on any deductions from a comparison in which the value of the coefficient is based upon so short an interval as five years (1886–91), but, on the other hand, the secular change has never before been determined from such a wealth of material as we have had at our disposal, and the result, as far as the Declination and Dip are concerned, is in accord with the conclusion at which we arrived in our previous paper.

We there gave reasons for believing that the secular change of Declination (pp. 89–91) and of Dip (pp. 83 and 87) has of late been less rapid, and as our previous table was based upon a comparison of our observations with those of Sir F. EVANS, in 1872, and of earlier observers, it may well be that the numbers were a little too large.

Data as to variations of the Horizontal Force are more scanty, but there is reason to believe that, in the case of this element, the rate of secular change is increasing in Western Europe ("Memoir 1890," p. 92).

REDUCTION OF OBSERVATIONS MADE DURING THE 1886 SURVEY TO THE EPOCH OF THE NEW SURVEY.

Having determined the rate of secular change during the interval 1886–91, we reduced all the observations of which an account was given in our earlier Memoir to the epoch January 1, 1891.

These reduced observations, together with the Vertical Forces calculated from them, are entered, together with the additional results more recently obtained in Table XXIV. (p. 556).

In this table the two surveys are treated as one. In each of the three main divisions, viz., Scotland, England and Wales, and Ireland, the stations are arranged alphabetically.

They are numbered consecutively, but in the case of places at which observations were made in 1884–88 the numbers attached to them in our "1890 Memoir" are also given.

The values of the Declination, Dip, Horizontal and Vertical Forces are entered in red figures on Maps 5–9, and the true isomagnetic lines are shown in blue. They are drawn, not for equal differences in the values of the elements, but for such values as are most convenient for exhibiting the general form and irregularities in the lines.

In our previous paper we discussed at length the methods of drawing from these lines conclusions as to the nature of the disturbing forces, our object being to show that the direct results of observation led to the same conclusions as those which can be more easily drawn from the Disturbing Forces as calculated by our methods. We do not think it necessary to enlarge here on a proposition which has been sufficiently proved, and has received a strong confirmation from the agreement between the two surveys which has been already demonstrated in this paper.

Some facts, however, connected with the true isomagnetics deserve attention, but we reserve comment on them till the sections in which we deal with the disturbances in detail.

It is only necessary to remind the reader (1) that the curves are drawn freehand, and that we do not aim at indicating more than that the line at which an element attains a certain value lies somewhere between the places at which it is less and greater than that amount respectively ; (2) that in some few instances it is impossible to decide between alternative paths, and that in these cases the lines show what, in our judgment, is the most probable representation of the facts ; (3) that, in some cases, purely local disturbances have possibly led us to depict the true lines as departing more from the terrestial lines than they really do. We are, of course, fully aware of this risk, and we can only say that in the few cases in which the evidence for such deviations depends on one station only, they are not more remarkable than those whose real existence is conclusively proved.

Reduction of the Terrestrial Isomagnetics Obtained from the 1886 Survey to the Epoch of the New Survey, and Determination of the Mean Calculated Terrestrial Isomagnetics.

We published in our "1890 Memoir" tables of the calculated values of the elements at the intersections of whole degrees of latitude and longitude for the epoch January 1, 1886.

By adding (algebraically) to these the secular changes for the five years 1886–91 given in Table XIV., p. 530, we obtain values which, if the terrestrial isomagnetics for 1886 and 1891 were absolutely correct, and if the secular change had been perfectly determined, should agree with the numbers given in Tables III., VI., and IX.

As a matter of fact there is a very good agreement throughout the centre of the Kingdom, but near the borders (where the errors of the isomagnetics are likely to be relatively large) the discrepancies are considerable.

This being the first occasion on which a comparison has been possible between two sets of isomagnetics drawn from observations made at large numbers of stations, with a short intervening period of time, it is desirable to give the details of the accord or disagreement between them.

In the following tables, therefore, three numbers are given as corresponding to each point defined by whole degrees of latitude and longitude.

The first of these is obtained from the 1886 survey and the secular change.

Thus, according to Table VIII., "1890 Memoir," p. 322, the declination at latitude 55, longitude 4, was 20° 57′·4. From Table XIV. of this paper the secular change at the same place has been 36′·3. From these data the declination on January 1, 1891, would be 20° 57′·4 − 36′·3 = 20° 21′·1, which is entered in Table XVII.

According to Table III., p. 508, however, the value found by the present survey is 20° 20′·1. This number is also entered in Table XVII., and the difference, 1′·0 (taken positive when the 1886 survey gives the larger result), is the algebraical sum of the errors introduced in the operations of determining the positions of the two sets of isomagnetics and of reducing them to the same epoch.

TABLE

Lat.	Longitude.						
	10° W.	9°.	8°.	7°.	6°.	5°.	4°.
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′
59				23 31·3 23 33·1 − 1·8	22 51·3 22 52·5 − 1·2	22 11·4 22 12·0 − 0·6	21 31·4 21 31·4 0·0
58			23 45·4 23 47·2 − 1·8	23 6·9 23 8·2 − 1·3	22 28·4 22 29·1 − 0·7	21 49·9 21 50·1 − 0·2	21 11·4 21 11·0 + 0·4
57			23 21·2 23 22·7 − 1·5	22 44·2 22 45·2 − 1·0	22 7·2 22 7·6 − 0·4	21 30·2 21 30·1 + 0·1	20 53·2 20 52·5 + 0·7
56		23 34·3 23 36·2 − 1·9	22 58·8 23 0·1 − 1·3	22 23·3 22 24·1 − 0·8	21 47·8 21 48·0 − 0·2	21 12·3 21 12·0 + 0·3	20 36·8 20 35·9 + 0·9
55	23 45·1 23 47·4 − 2·3	23 11·0 23 12·8 − 1·8	22 37·1 22 38·3 − 1·2	22 3·0 22 3·7 − 0·7	21 29·1 21 29·2 − 0·1	20 55·0 20 54·6 + 0·4	20 21·1 20 20·1 + 1·0
54	23 19·5 23 21·8 − 2·3	22 46·9 22 48·7 − 1·8	22 14·5 22 15·7 − 1·2	21 41·9 21 42·6 − 0·7	21 9·5 21 9·6 − 0·1	20 36·9 20 36·5 + 0·4	20 4·5 20 3·5 + 1·0
53	22 51·9 22 55·1 − 3·2	22 20·8 22 23·3 − 2·5	21 49·9 21 51·5 − 1·6	21 18·8 21 19·8 − 1·0	20 47·9 20 48·2 − 0·3	20 16·8 20 16·5 + 0·3	19 45·9 19 45·0 + 0·9
52	22 22·4 22 27·1 − 4·7	21 52·8 21 56·4 − 3·6	21 23·4 21 25·8 − 2·4	20 53·8 20 55·3 − 1·5	20 24·4 20 24·9 − 0·5	19 54·8 19 54·7 + 0·1	19 25·4 19 24·6 + 0·8
51				20 28·1 20 30·1 − 2·0	20 0·1 20 1·0 − 0·9	19 32·1 19 32·1 0·0	19 4·1 19 3·4 + 0·7
50						19 10·1 19 10·3 − 0·2	18 43·6 18 43·0 + 0·6
Lat.	10° W.	9°.	8°.	7°.	6°.	5°.	4°.

XVII.

Longitude.						Lat.
3°.	2°.	1° W.	0°.	1° E.	2°	
° ′	° ′	° ′	° ′	° ′	° ′	°
20 51·4 20 50·9 + 0·5	20 11·4 20 10·3 + 1·1					59
20 32·9 20 32·0 + 0·9	19 54·4 19 52·9 + 1·5					58
20 16·2 20 15·0 + 1·2	19 39·2 19 37·4 + 1·8					57
20 1·3 19 59·9 + 1·4	19 25·8 19 23·8 + 2·0	18 50·3 18 47·8 + 2·5				56
19 47·0 19 45·5 + 1·5	19 13·1 19 11·0 + 2·1	18 39·0 18 36·4 + 2·6	18 5·1 18 1·9 + 3·2			55
19 31·9 19 30·4 + 1·5	18 59·5 18 57·4 + 2·1	18 26·9 18 24·3 + 2·6	17 54·5 17 51·3 + 3·2			54
19 14·8 19 13·4 + 1·4	18 43·9 18 41·9 + 2·0	18 12·8 18 10·5 + 2·3	17 41·9 17 39·2 + 2·7	17 10·8 17 7·8 + 3·0	16 39·9 16 36·5 + 3·4	53
18 55·8 18 54·6 + 1·2	18 26·4 18 24·7 + 1·7	17 56·8 17 55·0 + 1·8	17 27·4 17 25·4 + 2·0	16 57·8 16 55·8 + 2·0	16 28·4 16 26·5 + 1·9	52
18 36·1 18 35·0 + 1·1	18 8·1 18 6·8 + 1·3	17 40·1 17 38·9 + 1·2	17 12·1 17 11·1 + 1·0	16 44·1 16 43·7 + 0·4	16 16·1 16 16·4 − 0·3	51
18 17·1 18 16·2 + 0·9	17 50·6 17 49·7 + 0·9					50
3°.	2°.	1° W.	0°.	1° E.	2°	Lat.

TABLE

Lat.	Longitude.						
N.	10° W.	9°.	8°.	7°.	6°.	5°.	4°.
° 59				1·4978 1·4888 +90	1·5029 1·4970 +59	1·5081 1·5051 +30	1·5135 1·5130 +5
58			1·5291 1·5236 +55	1·5344 1·5313 +31	1·5397 1·5388 +9	1·5450 1·5462 −12	1·5503 1·5533 −30
57			1·5661 1·5646 +15	1·5713 1·5714 −1	1·5767 1·5781 −14	1·5819 1·5848 −29	1·5873 1·5912 −39
56			1·6029 1·6031 −2	1·6082 1·6093 −11	1·6135 1·6154 −19	1·6188 1·6214 −26	1·6241 1·6273 −32
55	1·6293 1·6284 +9	1·6345 1·6342 +3	1·6399 1·6400 −1	1·6451 1·6458 −7	1·6505 1·6515 −10	1·6557 1·6571 −14	1·6611 1·6626 −15
54	1·6662 1·6653 +9	1·6715 1·6710 +5	1·6768 1·6766 +2	1·6821 1·6821 0	1·6874 1·6876 −2	1·6927 1·6930 −3	1·6980 1·6983 −3
53	1·7030 1·7030 0	1·7084 1·7085 −1	1·7142 1·7141 +1	1·7200 1·7195 +5	1·7259 1·7249 +10	1·7316 1·7304 +12	1·7372 1·7358 +14
52	1·7446 1·7410 36	1·7503 1·7465 +38	1·7561 1·7522 +39	1·7616 1·7579 +37	1·7671 1·7638 +33	1·7724 1·7699 +25	1·7778 1·7762 +16
51				1·8027 1·7983 +44	1·8081 1·8051 +30	1·8135 1·8119 +16	1·8192 1·8188 +4
50						1·8550 1·8549 +1	1·8612 1·8621 −9
Lat.	10° W.	9°.	8°.	7°.	6°.	5°.	4°.

XVIII.

Longitude.						Lat.
3°.	2°.	1° W.	0°.	1° E.	2°.	N.
1·5187 1·5207 −20	1·5241 1·5283 −42					° 59
1·5556 1·5602 −46	1·5609 1·5669 −60					58
1·5925 1·5974 −49	1·5979 1·6035 −56					57
1·6294 1·6330 −36	1·6347 1·6387 −40					56
1·6663 1·6680 −17	1·6717 1·6733 −16	1·6769 1·6786 −17	1·6823 1·6839 −16			55
1·7033 1·7036 −3	1·7086 1·7089 −3	1·7139 1·7142 −3	1·7194 1·7195 −1			54
1·7426 1·7415 +11	1·7480 1·7474 +6	1·7533 1·7534 −1	1·7586 1·7595 −9	1·7638 1·7659 −21	1·7690 1·7724 −34	53
1·7831 1·7826 +5	1·7886 1·7892 −6	1·7940 1·7959 −19	1·7997 1·8028 −31	1·8054 1·8099 −45	1·8113 1·8172 −59	52
1·8249 1·8259 −10	1·8308 1·8330 −22	1·8368 1·8403 −35	1·8432 1 8476 −44	1·8497 1·8551 −54	1·8564 1·8627 −63	51
1·8675 1·8693 −18.	1·8736 1·8766 −30					50
3°.	2°.	1° W.	0°.	1° E.	2°.	Lat.

Table

Lat.	Longitude.						
N.	10° W.	9°.	8°.	7°.	6°.	5°.	4°.
° 59	° ′	° ′	° ′	° ′ 72 31·2 72 33·2 −2·0	° ′ 72 25·4 72 27·2 −1·8	° ′ 72 19·5 72 21·3 −1·8	° ′ 72 13·6 72 15·2 −1·6
58			72 6·4 72 6·5 −0·1	72 0·4 72 0·4 0·0	71 54·4 71 54·3 +0·1	71 48·3 71 48·2 +0·1	71 42·1 71 42·0 +0·1
57			71 34·7 71 33·0 +1·7	71 28·5 71 26·7 +1·8	71 22·3 71 20·3 +2·0	71 16·0 71 14·1 +1·9	71 9·7 71 7·7 +2·0
56			71 2·0 70 58·6 +3·4	70 55·7 70 52·7 +3·0	70 49·3 70 46·8 +2·5	70 42·7 70 40·9 +1·8	70 36·2 70 34·9 +1·3
55	70 41·3 70 38·3 +3·0	70 34·9 70 32·2 +2·7	70 28·5 70 26·2 +2·3	70 21·9 70 20·1 +1·8	70 15·3 70 14·0 +1·3	70 8·6 70 7·9 +0·7	70 1·9 70 1·7 +0·2
54	70 7·2 70 5·2 +2·0	70 0·6 69 58·9 +1·7	69 54·0 69 52·7 +1·3	69 47·3 69 46·4 +0·9	69 40·5 69 40·1 +0·4	69 33·6 69 33·8 −0·2	69 26·8 69 27·4 −0·6
53	69 32·2 69 30·9 +1·3	69 25·5 69 24·5 +1·0	69 18·7 69 18·0 +0·7	69 11·8 69 11·5 +0·3	69 4·8 69 5·0 −0·2	68 57·7 68 58·4 −0·7	68 50·7 68 51·8 −1·1
52	68 56·3 68 55·4 +0·9	68 49·4 68 48·7 +0·7	68 42·4 68 41·9 +0·5	68 35·3 68 35·2 +0·1	68 28·2 68 28·4 −0·2	68 20·9 68 21·5 −0·6	68 13·6 68 14·6 −1·0
51					67 50·4 67 50·2 +0·2	67 42·9 67 43·0 −0·1	67 35·4 67 35·8 −0·4
50					67 11·5 67 10·3 +1·2	67 3·7 67 2·7 +1·0	66 55·9 66 55·1 +0·8
Lat.	10° W.	9°.	8°.	7°.	6°.	5°.	4°.

XIX.

Longitude.						Lat.
3°.	2°.	1° W.	0°.	1° E.	2°.	N.
° ′ 72 7·7 72 9·2 −1·5	° ′ 72 1·6 72 3·0 −1·4	° ′	° ′	° ′	° ′	° 59
71 36·0 71 35·8 +0·2	71 29·7 71 29·6 +0·1					58
71 3·3 71 1·3 +2·0	70 56·9 70 55·4 +1·5					57
70 29·7 70 28·9 +0·8	70 23·0 70 22·9 +0·1	70 16·4 70 16·9 −0·5				56
69 55·2 69 55·5 −0·3	69 48·4 69 49·3 −0·9	69 41·6 69 43·0 −1·4				55
69 19·9 69 20·9 −1·0	69 12·9 69 14·5 −1·6	69 5·9 69 8·0 −2·1	68 58·8 69 1·4 −2·6			54
68 43·6 68 45·0 −1·4	68 36·4 68 38·3 −1·9	68 29·3 68 31·5 −2·2	68 22·0 68 24·7 −2·7	68 14·7 68 17·8 −3·1	68 7·3 68 11·0 −3·7	53
68 6·3 68 7·6 −1·3	67 58.9 68 0·6 −1·7	67 51·5 67 53·5 −2·0	67 44·0 67 46·3 −2·3	67 36·5 67 39·1 −2·6	67 28·9 67 31·8 −2·9	52
67 27·9 67 28·4 −0·5	67 20·2 67 21·1 −0·9	67 12·6 67 13·7 −1·1	67 4·8 67 6·2 −1·4	66 57·0 66 58·6 −1·6	66 49·1 66 50·9 −1·8	51
66 48·1 66 47·4 +0·7	66 40·1 66 39·6 +0·5	66 32·1 66 31·8 +0·3	66 24·0 66 23·9 +0·1	66 15·9 66 15·8 +0·1		50
3°.	2°.	1° W.	0°.	1° E.	2°.	Lat.

The differences between corresponding numbers in the above tables are such as might be expected if the directions of the terrestrial isomagnetics, or the distribution of secular change, had not been quite correctly determined.

The discrepancies are very small in central districts. In the south-east of England and south-west of Ireland the combined errors of Horizontal Force and Dip produce considerable differences in the Vertical Forces calculated from the two sets of figures.

The following numbers are those given for latitude 52°, near the eastern and western limits of the area of the survey.

Longitude.		H.	θ.	V.	Difference.
2° E. . .	1886	1·8113	67° 28'·9	4·3689	−·0247
	1891	1·8172	67° 31'·8	4·3936	
10° W. .	1886	1·7446	68° 56'·3	4·5302	+·0129
	1891	1·7410	68° 55'·4	4·5173	

This shows that when the two surveys are compared, there is in this extreme case, as we pass from Harwich to Valentia, a relative change in the datum-plane from which the Vertical Force Disturbances are measured, of 0·0376 metric, or 0·00376 C.G.S. unit.

This number is no doubt large, but it must be remembered that the discovery of lines of attraction depends upon the comparison of Vertical Forces at neighbouring stations, and that, therefore, a gradual slope in the datum-plane will not seriously affect the results.

It is also to be noted that if we accept the mean of the results given by the two surveys as free from error, the correction which would then have to be applied to our 1886 survey, would be of the kind that we anticipated.

In our previous paper ("1890 Memoir," p. 266) we drew attention to the fact that positive and negative Vertical Force Disturbances were predominant in the south-east, and in the north and west respectively.

We also expressed a doubt as to whether this corresponded with physical facts.

Now, since the Disturbing Force is the observed less the calculated value of the vertical force, an excess of positive disturbances, if unreal, indicates that the calculated values are too small. Hence, the increase in the calculated Vertical Forces in the south-east of England, and the corresponding decrease in the south-west of Ireland, are changes of the kind required to diminish the peculiarities previously observed.

The probability that this kind of error affected our earlier results was also dwelt upon in a paper "On the Magnetic Permeability of Rocks and Regional Magnetic Disturbances" ('Proc. Royal Soc.,' vol. 48, p. 532, 1890), published by one of us before the observations had been made on which the new terrestrial lines are based.

BRITISH MUSEUM
NATURAL HISTORY

Latitude N.	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.
59°							23° 32′·2	*40′·3*	22° 51′·9	*40′·2*	22° 11′·7
							24′·6		*23′·1*		*21′·7*
58°					23° 46′·3	*38′·7*	23° 7′·6	*38′·8*	22° 28′·8	*38′·8*	21° 50′·0
					24′·3		*22′·9*		*21′·4*		*19′·8*
57°					23° 22′·0	*37′·3*	22° 44′·7	*37′·3*	22° 7′·4	*37′·2*	21° 30′·2
					22·5		*21′·0*		*19′·5*		*18′·0*
56°			23° 35′·3	*35′·8*	22° 59′·5	*35′·8*	22° 23′·7	*35′·8*	21° 47′·9	*35′·7*	21° 12′·2
			23′·4		*21′·8*		*20′·3*		*18′·7*		*17′·4*
55°	23° 46′·3	*34′·4*	23° 11′·9	*34′·2*	22° 37′·7	*34′·3*	22° 3′·4	*34′·2*	21° 29′·2	*34′·4*	20° 54′·8
	25′·6		*24′·1*		*22′·6*		*21′·1*		*19′·6*		*18′·1*
54°	23° 20′·7	*32′·9*	22° 47′·8	*32′·7*	22° 15′·1	*32′·8*	21° 42′·3	*32′·7*	21° 9′·6	*32′·9*	20° 36′·7
	27′·2		*25′·7*		*24′·4*		*23′·0*		*21′·5*		*20′·0*
53°	22° 53′·5	*31′·4*	22° 22′·1	*31′·4*	21° 50′·7	*31′·4*	21° 19′·3	*31′·2*	20° 48′·1	*31′·4*	20° 16′·7
	28′·7		*27′·5*		*26′·1*		*24′·7*		*23′·4*		*21′·9*
52°	22° 24′·8	*30′·2*	21° 54′·6	*30′·0*	21° 24′·6	*30′·0*	20° 54′·6	*29′·9*	20° 24′·7	*29′·9*	19° 54′·8
									24′·1		*22′·7*
51°									20° 0′·6	*28′·5*	19° 32′·1
											21′·9
50°											19° 10′·2
	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.

3° W.		2° W.		1° W.		0°		1° E.		2° E.	Latitude N.
20° 51′·2	*40′·3*	20° 10′·9									59°
18′·8		*17′·3*									
20° 32′·4	*38′·8*	19° 53′·6									58°
16′·8		*15′·3*									
20° 15′·6	*37′ 3*	19° 38′·3									57°
15′·0		*13′·5*									
20° 0′·6	*35′·8*	19° 24′·8	*35′·7*	18° 49′·1							56°
14′·3		*12′·7*		*11′·4*							
19° 46′·3	*34′·2*	19° 12′·1	*34′·4*	18° 37′·7	*34′·2*	18° 3′·5					55°
15′·1		*13′·6*		*12′·1*		*10′.6*					
19° 31′·2	*32′·7*	18° 58′·5	*32′·9*	18° 25′·6	*32′·7*	17° 52′·9					54°
17′·1		*15°·6*		*13′·9*		*12′·3*					
19° 14′·1	*31′·2*	18° 42′·9	*31′·2*	18° 11′·7	*31′·1*	17° 40′·6	*31′·3*	17° 9′·3	*31′·1*	16° 38′·2	53°
18′·9		*17′·3*		*15′·8*		*14′·8*		*12′·5*		*10′·8*	
18° 55 ·2	*29′·6*	18° 25′·6	*29′·7*	17° 55′·9	*29′·5*	17° 26′·4	*29′·6*	16° 56′·8	*29′·4*	16° 27′·4	52°
19′·6		*18′·1*		*16′·4*		*14′·8*		*12′·9*		*11′·1*	
18° 35′·6	*28′·1*	18° 7′·5	*28′·0*	17° 39′·5	*27′·9*	17° 11′·6	*27′·7*	16° 43′·9	*27′·6*	16° 16′·3	51°
18′·9		*17′·3*		*15′·7*		*14′·0*		*12′·3*			
18° 16′·7	*26′·5*	17° 50′·2	*26′·4*	17° 23′·8	*26′·2*	16° 57′·6	*26′·0*	16° 31′·6			50°
3° W.		2° W.		1° W.		0°		1° E.		2° E.	

BRITISH
NATURAL HISTORY.

BRITISH MUSEUM NATURAL HISTORY.

Latitude N.	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.
59°							1·4933	*67*	1·5000	*66*	1·5066
							396		*393*		*390*
58°					1·5264	*65*	1·5329	*64*	1·5393	*63*	1·5456
					390		*385*		*381*		*378*
57°					1·5654	*60*	1·5714	*60*	1·5774	*60*	1·5834
					376		*374*		*371*		*367*
56°					1·6030	*58*	1·6088	*37*	1·6145	*56*	1·6201
					370		*367*		*365*		*363*
55°	1·6289	*55*	1·6344	*56*	1·6400	*55*	1·6455	*55*	1·6510	*54*	1·6564
	368		*369*		*367*		*366*		*365*		*365*
54°	1·6657	*56*	1·6713	*54*	1·6767	*54*	1·6821	*54*	1·6875	*54*	1·6929
	373		*372*		*375*		*377*		*379*		*381*
53°	1·7030	*55*	1·7085	*57*	1·7142	*56*	1·7198	*56*	1·7254	*56*	1·7310
	398		*399*		*400*		*400*		*401*		*402*
52°	1·7428	*56*	1·7484	*58*	1·7542	*56*	1·7598	*57*	1·7655	*57*	1·7712
									411		*415*
51°									1·8066	*61*	1·8127
											423
50°											1·8550
	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.

To face Page 544.

3° W.		2° W.		1° W.		0°.		1° E.		2° E.	Latitude N.
1·5197	*65*	1·5262									59°
382		*377*									
1·5579	*60*	1·5639									58°
371		*368*									
1·5950	*57*	1·6007									57°
362		*360*									
1·6312	*55*	1·6367									56°
360		*358*									
1·6672	*53*	1·6725	*53*	1·6778	*53*	1·6831					55°
363		*363*		*363*		*364*					
1·7035	*53*	1·7038	*53*	1·7141	*54*	1·7195					54°
386		*389*		*393*		*396*					
1·7421	*56*	1·7477	*57*	1·7534	*57*	1·7591	*58*	1·7649	*58*	1·7707	53°
408		*412*		*416*		*422*		*428*		*436*	
1·782[illegible]	*60*	1·7889	*61*	1·7950	*63*	1·8013	*64*	1·8077	*66*	1·8143	52°
425		*430*		*436*		*441*		*447*		*453*	
1·8254	*65*	1·8319	*67*	1·8386	*68*	1·8454	*70*	1·8524	*72*	1·8596	51°
430		*432*		*434*		*437*		*440*			
1·8684	*67*	1·8751	*69*	1·8820	*71*	1·8891	*73*	1·8964			50°
3° W.		2° W.		1° W.		0°.		1° E.		2° E.	

BRITISH MUSEUM NATURAL HISTORY.

BRITISH MUSEUM NATURAL HISTORY

Latitude N.	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.
59°							72° 32′·2	*5′·9*	72° 26′·3	*5′·9*	72° 20′·4
							31′·7		*31′·9*		*32′·1*
58°					72° 6′·5	*6′·0*	72° 0′·5	*6′·1*	71° 54′·4	*6′·1*	71° 48′·3
					32′·6		*32′·9*		*33′·1*		*33′·2*
57°					71° 33′·9	*6′·3*	71° 27′·6	*6′·3*	71° 21′·3	*6′·2*	71° 15′·1
					33′·6		*33′·4*		*33′·2*		*33′·3*
56°					71° 0′·3	*6′·1*	70° 54′·2	*6′·1*	70° 48′·1	*6′·3*	70° 41′·8
					32′·9		*33′·2*		*33′·4*		*33′·5*
55°	70° 39′·8	*6′·2*	70° 33′·6	*6′·2*	70° 27′·4	*6′·4*	70° 21′·0	*6′·3*	70° 14′·7	*6′·4*	70° 8′·3
	33′·6		*33′·8*		*34′·0*		*34′·1*		*34′·4*		*34′·6*
54°	70° 6′·2	*6′·4*	69° 59′·8	*6′·4*	69° 53′·4	*6′·5*	69° 46′·9	*6′·6*	69° 40′·3	*6′·6*	69° 33′·7
	34′·6		*34′·8*		*35′·0*		*35′·2*		*35′·4*		*35′·6*
53°	69° 31′·6	*6′·6*	69° 25′·0	*6′·6*	69° 18′·4	*6′·7*	69° 11′·7	*6′·8*	69° 4′·9	*6′·8*	68° 58′·1
	35′·7		*35′·9*		*36′·2*		*36′·4*		*36′·6*		*36′·9*
52°	68° 55′·9	*6′·8*	68° 49′·1	*6′·9*	68° 42′·2	*6′·9*	68° 35′·3	*7′·0*	68° 28′·3	*7′·1*	68° 21′·2
									38′·0		*38′·2*
51°									67° 50′·3	*7′·3*	67° 43′·0
									39′·4		*39′·8*
50°									67° 10′·9	*7′·7*	67° 3′·2
	10° W.		9° W.		8° W.		7° W.		6° W.		5° W.

To face Page 544.

3° W.		2° W.		1° W.		0°.		1° E.		2° E.	Latitude N.
72° 8′·4	*6′·1*	72° 2′·3									59°
32′·5		*32′·6*									
71° 35′·9	*6′·2*	71° 29′·7									58°
33′·6		*33′·5*									
71° 2′·3	*6′·1*	70° 56′·2									57°
33′·0		*33′·2*									
70° 29′·3	*6′·3*	70° 23′·0	*6′·3*	70° 16′ 7							56°
33′·9		*34′·1*		*34′·4*							
69° 55′·4	*6′·5*	69° 48′·9	*6′·6*	69° 42′·3							55°
35′·0		*35′·2*		*35′·3*							
69° 20′·4	*6′·7*	69° 13′·7	*6′·7*	69° 7′·0	*6′·9*	69° 0 ·1					54°
36′·1		*36′·3*		*36′·6*		*36′·7*					
68° 44′·3	*6′·9*	68° 37′·4	*7′·0*	68° 30′·4	*7′·0*	68° 23′·4	*7′·1*	68° 16′·3	*7′·1*	68° 9′·2	53°
37′·4		*37′·7*		*37′·9*		*38′·2*		*38′·5*		*38′·8*	
68° 6′·9	*7′·2*	67° 59′·7	*7′·2*	67° 52′·5	*7′·3*	67° 45′·2	*7′·4*	67° 37′·8	*7′·4*	67° 30′·4	52°
38′·7		*39′·0*		*39′·3*		*39′·7*		*40′·0*		*40′·4*	
67° 28′·2	*7′·5*	67° 20′·7	*7′·5*	67° 13′·2	*7′·7*	67° 5′·5	*7′·7*	66° 57′·8	*7′·8*	66° 50′·0	51°
40′·4		*40′·8*		*41′·2*		*41′·5*		*41′·9*			
66° 47′·8	*7′·9*	66° 39′·9	*7′·9*	66° 32′·0	*8′·0*	66° 24′·0	*8′·1*	66° 15′·9			50°
3° W.		2° W.		1° W.		0°.		1° E.		2° E.	

BRITISH MUSEUM NATURAL HISTORY.

We think then that the error in determining the datum-plane from which Vertical Force Disturbances are measured, is sufficiently great to make it impossible to draw conclusions from the results of the two surveys, without reducing them to the same set of terrestrial lines. Otherwise there would be a risk that the stations of the one survey would appear, relatively to those of the other, as places of high Vertical Force, or *vice versâ*.

If the Vertical Force Disturbances at two stations were found in the earlier survey to be 100 and 0 respectively, and if in the second survey the corresponding quantities at two closely neighbouring stations were 0 and − 100, the two results would be in accord as to the relative change of Vertical Force Disturbance on passing from the one neighbourhood to the other, but, inasmuch as the absolute values are different, they would appear discordant if combined without further correction.

That agreement between the relative magnetic levels of neighbouring districts has been obtained is conclusively proved by the identity of the ridge lines and peaks shown in Map 4 with those depicted in our "1890 Memoir"; it only remains, therefore, to decide how a common datum-plane shall be fixed. It might seem at first sight that greater weight ought to be given to the 1891 terrestrial lines since they have been found from a much larger number of stations, but the difficulty of determining the true lines is not so much due to errors of observation or to local disturbance at particular stations, as to the fact that the Disturbing Forces over large districts affect the elements in the same way. In other words, the divergence between the district and terrestrial lines is caused not by errors but by regional disturbances.

This is proved by a comparison of the district and terrestrial lines of the two surveys, which display the same peculiarities in spite of the fact that lines corresponding to given values of the elements have shifted from one position to another between the two epochs.

To prove this we may draw particular attention to the Horizontal Force isomagnetics corresponding to 1·70 and 1·65 metric unit, to the isoclinals corresponding to Dips of 69°, 70°, and 71°, and to the isogonals in the north of Scotland and in the south-east of England.

It follows from this that, if only the number of stations is sufficiently large to make the disturbance at any one station unimportant, no great advantage is obtained by multiplying the number of stations from which the district curves are deduced.

We, therefore, determined to give equal weight to the terrestrial lines furnished by each of the Surveys, and to take the mean of the numbers in Tables XVII.–XIX. as giving the mean terrestrial isomagnetics for January 1, 1891. The results are given in Tables XX., XXI., and XXII.

It will be observed that the elements do not vary quite regularly from point to point. This is due to the facts that in some cases different formulæ express the equations to the isomagnetic curves for the same element in different parts of the kingdom, thereby introducing small discontinuities, and that in others the equations contain periodic terms. It would, no doubt, have been possible to smooth out these irregularities, but we adhere to the rule we have throughout followed of not in any way modifying the terrestrial isomagnetics, which have been adopted as most closely representing the general form of the district curves.

It is difficult to devise any conclusive test to ascertain whether, when these tables are used, there is still in any region a residual error, which makes the stations of either survey peculiar by relatively great Vertical Force Disturbances. The best that occurs to us is to compare the Vertical Force Disturbances at the 25 repeat stations when referred to the mean of the two sets of terrestrial lines.

In this case, the results are quite independent, and should be affected only by the error of experiment, including in that term, (1) errors due to slight changes in the positions at which the observations were made, and (2) errors due to any real change in Disturbing Force which may conceivably have occurred.

In Table XXIII. the Vertical Disturbing Forces calculated from the two surveys are given in terms of 0·0001 metric or 0·00001 C.G.S. unit, together with their differences, and the means taken with and without reference to sign in each district :—

TABLE XXIII.

		1886.	1891.	Difference.	Means.
A	Lairg	− 68	− 95	+ 27	+ 29 ± 45
	Golspie	− 99	− 66	− 33	
	Thurso	− 88	−125	+ 37	
	Wick	+182	+ 97	+ 85	
B	Kyle Akin	−142	−105	− 37	− 29 ±109
	Gairloch	−389	−510	+121	
	Soa	−365	−195	−170	
C	Mablethorpe	+ 96	+208	−112	+ 7 ± 81
	Lincoln	+124	+ 31	+ 93	
	Gainsborough	+ 87	+ 48	+ 39	
D	Oxford	+102	− 25	+127	+ 33 ± 78
	St. Leonards	−136	−148	+ 12	
	Salisbury	− 1	− 83	+ 82	
	Tunbridge Wells	−186	− 97	− 89	
E	Armagh	−139	− 31	−108	− 61 ± 97
	Enniskillen	− 43	+ 37	− 80	
	Sligo	− 55	−127	+ 72	
	Carrick-on-Shannon	−140	− 12	−128	
F	Swansea	+ 26	+ 31	− 5	− 11 ± 13
	Cardiff	− 62	− 32	− 30	
	Milford	− 48	− 51	+ 3	
G	Charleville	−116	−102	− 14	+ 35 ± 42
	Killarney	+ 1	− 3	+ 4	
	Bantry	+ 57	− 39	+ 96	
	Valentia	0	− 55	+ 54	

We take it that the result will be considered satisfactory if the mean difference, calculated irrespective of sign, is of the same order as the error of experiment, and if the algebraical mean is considerably less than this quantity in each district.

The first result would show that the differences are not unreasonably large, the second, that errors of a particular sign do not predominate in any locality.

In our "1890 Memoir" we proved that the probable differences between two measurements of the Horizontal Force and Dip were 0·00056 metric unit and 1′·0 respectively.

The first of these numbers was calculated from the differences between observations made at the same time, and, as we pointed out, did not include the error of determination of the temperature.

To this must now be added errors due to slight changes of position, to variability and uncertainty in the determinations of secular change, and to the use of different instruments by different observers. Taking all these into account, we do not think that it is too much to assume that the probable difference between the results of the two sets of observations at the repeat stations might be four times as great, or 0·00224 metric unit.

This estimate agrees very well with our experience in the 1886 Survey, during which on eight occasions we repeated the Horizontal Force observations at the same or at closely neighbouring stations, at intervals of less than two years. The places were Oban (Kerrera), Cambridge, Harpenden, Manchester, Reading, Dublin, Galway, and Enniskillen. The mean difference between the two measurements of Horizontal Force was 0·0017.

If, then, we take the mean difference between two Horizontal Force measurements as 0·0020, since the tangent of the angle of Dip varies from about 2·5 to 3, the mean difference between the measurements of Vertical Force will vary from about 0·0050 in the south to 0·0060 in the north, on account of the error in the Horizontal Forces.

The mean difference between the Dips obtained with the two needles used in each observation in our earlier survey was one minute of arc. The measurement of the Inclination was repeated at three of the above stations. The mean difference was 1′·4.

As a change of 1′ in the Dip alters the tangent of the angle of Dip by about one-thousandth part, the mean difference in the Vertical Force Disturbance would therefore be about 0·0045, owing to the errors in the measurement of the Dip.

On the whole, then, there seems every reason to expect an average difference of about 0·0070 metric unit between two independent measures of the Vertical Force made within a comparatively short interval of time. As the mean of the differences in Table XXIII. is only 0·0066, it does not appear that they can be affected to any appreciable extent by residual errors of any kind. In other words, the results of the two surveys as to Vertical Force Disturbances may be safely combined when both are reduced by the aid of the mean terrestrial isomagnetics.

The range of the magnitude of the Vertical Force Disturbances at places where the surface is composed of sedimentary rocks, is about 0·0600 metric unit. On granite and gneiss the range is doubled, and in the neighbourhood of basalt (which we have avoided) it may be enormously increased. As, therefore, a single measurement does not on the average give a result correct to within ±0·0033 metric unit, we conclude that, although a doubt may sometimes arise as to the relative magnetic levels of two stations, the mean levels of groups of stations can be determined with adequate accuracy. This conclusion is borne out by a study of the maps of Vertical Force Disturbances given in our previous paper, and in the present Memoir (Map 12). No essential change, *i.e.*, no change which would alter the positions of the principal ridge lines to any important extent would be produced if the Vertical Force Disturbances were arbitrarily increased or diminished by 33 (*i.e.*, 0·0033 metric unit) even if the alterations were designed to produce the maximum change in the form of the lines.

The mean differences shown in Table XXIII, when taken irrespective of sign, thus appear to be of the magnitude which the error of experiment would lead us to expect, and, since the algebraical means are in all cases much less, there is no reason to believe that residual errors tend to accumulate in any particular district.

It is evident that some of the remarks which have been made with regard to the Vertical Force do not apply to the Declination and Horizontal Force. As we have laid no stress on the relative magnitudes of the Horizontal Disturbing Forces it is unnecessary to discuss them, but their direction is an absolute quantity, and anything which tended to alter the mean direction all over a particular district would make the results untrustworthy.

The change in the calculated direction of the Horizontal Disturbing Force produced by a given error in the Horizontal Force or Declination, depends upon the magnitude of the Disturbing Force itself, and it is evident that no valid result can be attained, unless the magnitude of the Disturbing Force exceeds the error of experiment.

We have already seen that the error of experiment in the measurement of H is on the average about ±0·0010.

Hence there will be no reason for surprise if, when the Horizontal Disturbing Force is only 0·0020 or 0·0030 metric unit, two different measurements reduced by means of different isomagnetics lead to discordant results.

Putting aside, on this account, the results at St. Leonards, Tunbridge Wells, and Charleville, we have tabulated the angles which the Disturbing Forces make with the geographical meridian at the repeat stations according to the two Surveys.

In the fourth column is the difference between the results, and in the fifth the difference when the two are reduced to the mean isomagnetics.

Station.	1886.	1891.	Difference.	Difference (reduced to mean isomagnetics).
	°	°	°	°
Lairg	− 79	−135	+56	+46
Golspie	− 92	−120	+28	+14
Thurso	− 53	− 70	+17	0
Wick	−146	−150	+ 4	0
Kyle Akin	+154	+165	−11	− 8
Gairloch	±180	−134	−46	−44
Soa	−166	−166	0	0
Mablethorpe	+113	+139	−26	−20
Lincoln	− 63	− 72	+ 9	+ 5
Gainsborough	− 36	− 17	−19	− 5
Oxford	−171	−163	− 8	− 1
Salisbury	− 29	− 83	+54	+46
Armagh	+ 27	+ 5	+22	+15
Enniskillen	+160	+162	− 2	+ 1
Sligo	−126	−131	+ 5	+ 9
Carrick-on-Shannon	+ 72	+ 88	−16	−23
Swansea	+ 4	− 8	+12	+16
Cardiff	− 35	− 29	− 6	+ 1
Milford	− 23	− 33	+10	+18
Killarney	+ 42	+ 32	+10	− 8
Bantry	+ 52	+ 18	+34	+ 2
Valentia	+ 42	+ 23	+19	− 1

It was sometimes impossible or inconvenient to repeat the observations exactly on the spot originally selected. This was the case at Lairg, Gairloch, Gainsborough, and Valentia.

The results are in accord with our previous estimates of the accuracy of our results, viz., that the directions of the disturbing forces as given by a single observation was correct to "within (in unfavourable cases) 15° or 20°" ("1890 Memoir," p. 269).

The difference of a single result from the mean of the two only exceeded these limits in three cases out of twenty-two when the same set of terrestrial isomagnetics were used, and only in four cases when the two independent sets of isomagnetics were employed. In two of these cases (Lairg and Gairloch) the positions occupied are known to have been different.

On the whole then, it appears that when the direction of the Horizontal Disturbing Force at any place is determined by means of two independent experiments, the difference between the results is of the same order of magnitude whether the same or two independently determined sets of terrestrial isomagnetics are employed. In other words, the error of the isomagnetics is not important as compared with the error of experiment.

As to the errors of experiment, we have adopted 0·0030 metric or 0·00030 C.G.S. unit as the limit to the magnitude of the Horizontal Disturbing Force, below which the calculated value of its direction cannot be relied on, and shall hereafter refer to it as the *limit of the accurate determination of direction.*

It is satisfactory to be able to state that, for the most part, stations at which the Horizontal Disturbing Force falls below this limit occur in groups, showing that the apparent smallness of the forces is due to a real absence of disturbance. Again: though at all, or very nearly all, the stations where a difficulty of interpreting the direction of the Horizontal Disturbance arises, its magnitude falls below the limit, yet in most cases the direction of the small Disturbing Forces agree well with each other, and with the results obtained at neighbouring stations where the disturbances are greater. The concordance is, in fact, so good as to prove that if we have made any mistake in the above discussion, it is in over-estimating the average magnitude of the error of experiment.

As regards the discrepancies at other stations, to whatever cause they are due (for we do not think that they are always errors of experiment in the ordinary sense), and large as they may at first sight seem, they are for the most part unimportant if the exact nature of our inquiry be borne in view. Our conclusions are based upon two independent groups of data: (1) the relative values of vertical disturbance at neighbouring stations; (2) the general drift of the direction of the Horizontal Forces. Apart from the fact that these lead to the same conclusions, our stations are so numerous that considerable errors in the directions of the Horizontal Disturbing Force at a few places could not seriously mislead us.

The means (taken irrespective of sign) of all the numbers in the last two columns of the table on p. 550 are about 19° and 13° respectively. Hence, on the average, our results are correct to 9°·5 if referred to independent terrestrial isomagnetics, and to 6°·5 if referred to the mean lines. This accuracy is quite sufficient for any use we have made of the observations. As to the occasional larger errors, we represented them graphically in our previous paper ("1890 Memoir," p. 269), and the two sets of arrows are shown for the repeat stations in Map 13 of the present Memoir. At no less than eight stations the directions are so nearly the same that we cannot depict them separately on the scale on which the map is drawn.

An inspection of the remaining fourteen is sufficient to show that our conclusions would not be affected if we were arbitrarily to reject either of the directions at any station.

The substantial agreement of the two surveys is further illustrated by the following tables. They are arranged exactly like the tables on pp. 510, 515, and 521, to show a number of points through which the terrestrial isomagnetics pass.

The upper figure in each square refers to the isomagnetics deduced from the 1891 survey alone; the lower to the mean isomagnetics for January 1, 1891, deduced from the two surveys.

LONGITUDES of the points of intersection with given lines of Latitude of the Isogonals deduced respectively from the 1891 Survey and from the mean of the 1886 and 1891 Surveys.

Latitude.	23°	22°	21°	20°	19°	18°	17°
58°·5	° ′ 6 28 6 30	° ′ 4 58 4 59	° ′ 3 28 3 28	° ′ 1 58 1 57	° ′	° ′	° ′
57°·5	7 5 7 6	5 31 5 32	3 57 3 57	2 23 2 22			
56°·5	7 41 7 42	6 4 6 4	4 26 4 26	2 48 2 47			
55°·5	8 18 8 20	6 36 6 37	4 54 4 55	3 12 3 12	1 30 1 29		
54°·5	8 59 9 0	7 12 7 13	5 26 5 26	3 39 3 38	1 52 1 51	0 6 W 0 3 W	
53°·5	9 45 9 47	7 53 7 55	6 2 6 2	4 11 4 10	2 19 2 17	0 27 0 25	
52°·5		8 41 8 44	6 45 6 46	4 50 4 49	2 53 2 51	0 55 0 52	1 4 E 1 6 E
51°·5		9 35 9 41	7 35 7 36	5 34 5 34	3 31 3 30	1 27 1 25	0 38 E 0 41 E
50°·5					4 15 4 14	2 3 2 2	0 10 E 0 10 E

LATITUDES of the points of intersection with given Lines of Longitude of Lines of Equal Horizontal Force deduced from the 1891 Survey and from the mean of the 1886 and 1891 Surveys.

Longitude.	1·85.	1·80.	1·75.	1·70.	1·65.	1·60.	1·55.
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′
10 W.			51 46 51 50	53 5 53 5	54 24 54 26		
9			51 55 51 58	53 14 53 14	54 34 54 35		
8			52 4 52 6	53 23 53 23	54 44 54 44	56 5 56 5	57 21 57 24
7			52 12 52 14	53 31 53 31	54 53 54 53	56 14 56 14	57 32 57 33
6		51 7 51 10	52 21 52 23	53 40 53 40	55 2 55 2	56 25 56 23	57 43 57 43
5	50 7 50 7	51 17 51 18	52 30 52 31	53 49 53 49	55 12 55 11	56 35 56 33	57 54 57 53
4	50 17 50 16	51 27 51 27	52 39 52 40	53 57 53 57	55 21 55 20	56 45 56 42	58 5 58 3
3	50 27 50 26	51 36 51 36	52 48 52 49	54 6 54 6	55 31 55 29	56 56 56 52	58 15 58 13
2	50 37 50 35	51 45 51 45	52 56 52 58	54 15 54 15	55 40 55 38	57 6 57 1	58 26 58 22
1	50 47 50 44	51 55 51 53	53 5 53 6	54 24 54 23	55 50 55 47	57 16 57 11	
0	50 57 50 54	52 4 52 2	53 14 53 14	54 33 54 32			
1 E.	51 7 51 3	52 14 52 11	53 23 53 22				
2	51 17 51 13	52 23 52 20					

LATITUDES of the points of intersection with given lines of Longitude of the Isoclinals deduced from the 1891 Survey, and from the mean of the 1886 and 1891 Surveys.

Longitude.	67°	68°	69°	70°	71°	72°
°	° ′	° ′	° ′	° ′	° ′	° ′
10 W.			52 8 52 7	53 51 53 49		
9			52 19 52 19	54 2 54 1		
8			52 30 52 30	54 13 54 12		
7			52 41 52 41	54 24 54 23	56 13 56 10	57 59 57 59
6			52 52 52 52	54 35 54 35	56 24 56 21	58 10 58 11
5	49 56 49 55	51 26 51 27	53 3 53 3	54 46 54 46	56 35 56 33	58 21 58 22
4	50 7 50 7	51 37 51 38	53 14 53 15	54 57 54 57	56 46 56 44	58 32 58 33
3	50 18 50 18	51 48 51 49	53 25 53 26	55 8 55 8	56 57 56 56	58 43 58 44
2	50 29 50 29	51 59 52 0	53 36 53 38	55 19 55 19	57 8 57 7	
1	50 40 50 40	52 10 52 12	53 47 53 49	55 30 55 31		
0	50 51 50 52	52 21 52 23	53 58 54 0			
1 E.	51 2 51 3	52 32 52 35				
2	51 13 51 15					

The lines given by these tables differ so little from those shown in Maps 1–3 for the 1891 Survey, that it is difficult to exhibit them in the same maps unless they are on a large scale. They are however drawn in continuous blue lines.

LOCAL AND REGIONAL DISTURBANCES.

Having thus proved that the two Surveys are in close accord as to the form and direction of the terrestrial isomagnetics, we have prepared the following tables, in which the observed values of the elements reduced to January 1, 1891, the calculated values for the same dates, and the difference between the observed and calculated values, *i.e.*, the Disturbances, are shown.

The stations, whether belonging to the earlier or later survey, are numbered consecutively, but in the second column the numbers assigned in our previous Memoir to first survey stations are also given.

The observed values given in the "1890 Memoir" are reduced to January 1, 1891, as described above. Two corrections are applied to the calculated values, viz.: firstly, that for secular change; and secondly, that for the difference between the 1886 isomagnetics (corrected for secular change) and the mean isomagnetics of the two surveys. Hence the Disturbances for these stations are not the same as those given in the "1890 Memoir," but, as has been shown, the differences are for the most part small. The calculated values may also be determined independently from Tables XX.–XXII., p. 544 above.

Thoughout the Tables the last figure in the observed and calculated values of the elements must be considered as only approximate. The Declinations and Dips may be affected with errors of reduction amounting to one or two tenths of a minute of arc, and the Horizontal Force by one or two units in the last place. In consequence of these the Vertical Forces may be erroneous to the extent of several units in the last place. Such differences are in all cases very much less than the error of experiment, and the labour involved in ensuring the accuracy of the last place would not really have added to the trustworthiness of our conclusions. We give the last place in the Tables, however, because we believe that in the large majority of cases it is very nearly if not absolutely correct.

The Disturbances of the Declinations, Horizontal Force, Dip and Vertical Force, are entered in Maps 9–12.

When the observed is greater than the calculated value of the Element, the Disturbance is positive and is indicated by a red figure. Negative Disturbances are printed in blue. As the boundaries between the regions of positive and of negative Disturbance are sufficiently indicated by the difference of colour, we have not drawn lines of separation between them.

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal

Scotland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
1	1	Aberdeen . . . . (1)	R & T	85	57° 9′ 50″	2° 6′ 5″	19° 39′·9	19° 44′·8	− 4′·9	1
		Between—								
2		Aberdeen and Ellon . . (2)	G	92	57 19 16	2 2 22	19 25·8	19 44·4	− 18·6	2
3		" " " . . (3)	"	92	57 15 10	2 3 22	19 12·5	19 44·4	− 31·9	3
4		" " " . . (4)	"	92	57 12 26	2 4 50	19 21·9	19 44·6	− 22·7	4
		Between—								
5		Aberdeen and Stonehaven (5)	"	92	57 5 14	2 7 10	19 36·6	19 44·1	− 7·5	5
6		" " " (6)	"	92	57 3 30	2 9 0	19 59·8	19 44·8	+ 15·0	6
7		" " " (7)	"	92	57 0 48	2 10 16	19 44·0	19 44·7	− 0·7	7
8		Abington	W	91	55 29 44	3 41 33	20 15·1	20 17·9	− 2·8	8
9		Aboyne	"	91	57 4 23	2 45 51	20 57·7	20 7·9	+ 49·8	9
10		Achanalt	T	92	57 36 31	4 54 40	21 24·3	21 38·8	− 14·5	10
11		Achnashellach	"	92	57 28 55	5 19 18	21 49·3	21 51·6	− 2·3	11
12		Alford	W	91	57 14 22	2 41 15	20 11·2	20 7·6	+ 3·6	12
13		Altnabreac	G	92	58 23 20	3 42 24	21 14·0	21 7·9	+ 6·1	13
14		Altnaharra	W	91	58 16 48	4 26 38	21 18·1	21 34·0	− 15·9	14
15		Alyth	G	92	56 37 8	3 14 4	20 26·3	20 18·5	+ 7·8	15
16		Arbroath	"	92	56 33 28	2 36 40	19 27·0	19 54·4	− 27·4	16
17		Ardgay	W	91	57 52 44	4 22 0	20 45·8	21 23·4	+ 22·4	17
18		Ardrossan	"	91	55 39 16	4 48 6	20 53·4	20 58·9	− 5·5	18
19	2	Arinagower (Coll.). . . .	R	85	56 37 5	6 31 12	23 0·8	22 18·7	+ 42·1	19
20*a*		Auchnasheen (*a*)	T	91	57 34 40	5 3 50	21 26·6	21 44·0	− 17·4	20*a*
20*b*		" (*b*)	W	91	57 34 40	5 3 50	21 26·9	21 44·0	− 17·1	20*b*
21		Auldgirth.	"	92	55 9 35	3 42 35	20 13·6	20 13·2	+ 0·4	21
22	3	L. Aylort (Gobbar Island) .	R & T	88	56 51 5	5 47 0	22 37·3	21 56·4	+ 40·9	22
23	4	Ayr	R	85	55 27 30	4 37 10	20 41·0	20 49·6	− 8·6	23
24	5	Ballater	R & T	85	57 2 53	3 2 6	19 52·4	20 17·6	− 25·2	24
25		Ballindalloch	W	91	57 24 36	3 23 5	20 14·5	20 36·9	− 22·4	25
26		Balmeanach (Skye) . . .	T	92	57 20 12	6 6 20	20 53·1	22 18·7	− 85·6	26
27	6	Banavie	R & L	85	56 51 0	5 5 40	21 28·1	21 30·8	− 2·7	27
28	7	Banff	R	85	57 39 57	2 31 17	20 27·3	20 8·1	+ 19·2	28
29		L. Bay.	T	92	57 29 42	6 33 51	23 49·0	22 39·8	+ 69·2	29
30		Bearraraig (Skye)	"	92	57 29 53	6 8 55	22 30·6	22 23·7	+ 6·9	30
31		Bernera (Barra Head) . .	"	89	56 47 12	7 37 30	23 43·1	23 3·1	+ 40·0	31
32		Bervie	G	92	56 50 35	2 16 38	19 45·0	19 46·7	− 1·7	32
33	8	Berwick	R & T	85	55 46 4	1 59 52	19 1·2	19 21·7	− 20·5	33
34		Bettyhill	W	91	58 31 35	4 13 20	21 17·2	21 30·8	− 13·6	34
35		Blair Athol	"	91	56 46 4	3 50 40	20 39·0	20 42·5	− 3·5	35
36	9	Boat of Garten	R & L	85	57 15 0	3 45 13	21 29·9	20 47·9	+ 42·0	36
37	10	L. Boisdale (S. Uist) . . .	R & T	84	57 8 55	7 18 0	22 12·6	22 58·9	− 46·3	37
38		Braemar	W	91	57 0 42	3 23 34	20 25·1	20 30·4	− 5·3	38
39		Braemore (L. Broom) . .	T	92	57 46 7	5 2 11	21 35·4	21 47·1	− 11·7	39
40		Bridgend (Islay)	"	91	55 46 45	6 15 13	23 9·2	21 52·7	+ 76·5	40
41		Broadford.	"	92	57 14 33	5 54 34	23 45·2	22 9·2	+ 96·0	41
42		Brodick (Arran)	"	91	55 35 4	5 9 27	21 48·9	21 10·7	+ 38·2	42
43		Broughton	G	92	55 36 40	3 24 30	20 11·1	20 9·7	+ 1·4	43
44		Buckie.	W	91	57 39 47	2 56 40	21 9·2	20 25·2	+ 44·0	44
45	11	Bunnahabhain (Islay) .	R & T	88	55 53 0	6 8 0	22 31·6	21 50·4	+ 41·2	45
46		Cabrach	G	92	57 20 46	3 1 52	20 31·3	20 22·8	+ 8·5	46
47		Cairn-o'-Mount	"	92	56 55 50	2 34 12	20 10·2	19 58·5	+ 11·7	47
48		Callander	W	91	56 14 23	4 13 3	20 45·9	20 48·2	− 2·3	48
49	12	Callernish (Lewis)	T	85	58 11 0	6 42 0	22 59·4	23 0·2	− 0·8	49
50		Camas-nan-Gall (Lochaber)	"	89	56 49 42	5 7 25	21 34·0	21 31·5	+ 2·5	50
51	13	Campbelton	R & T	84	55 25 30	5 36 5	21 30·1	21 23·2	+ 6·9	51
52	14	Canna	"	84	57 3 30	6 29 20	22 33·0	22 26·9	+ 6·1	52
53		Carskey (Cantyre)	T	91	55 18 40	5 41 50	. .	. .	. .	53
54		Carsphairn	W	92	55 13 5	4 16 1	20 33·1	20 33·3	− 0·2	54
55	15	Carstairs	R	85	55 41 10	3 40 11	20 15·6	20 19·6	− 4·0	55
56		Castle Bay (Barra) . . .	T	89	56 57 12	7 29 36	21 55·7	23 2·0	− 66·3	56

and Vertical Forces, Observed and Calculated, with Differences.

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
1	71° 7′·6	71° 2′·3	+ 5′·3	1·5831	1·5938	− ·0107	4·6310	4·6387	− ·0077	1
2	71 16·2	71 6·9	+ 9·3	1·5706	1·5887	− ·0181	4·6321	4·6442	− ·0121	2
3	71 27·8	71 4·6	+ 23·2	1·5585	1·5912	− ·0327	4·6480	4·6413	+ ·0067	3
4	70 51·2	71 3·4	− 12·2	1·6054	1·5925	+ ·0129	4·6239	4·6398	− ·0159	4
5	71 8·5	70 59·7	+ 8·8	1·5832	1·5967	− ·0135	4·6352	4·6359	− ·0007	5
6	71 1·0	70 59·0	+ 2·0	1·6034	1·5976	+ ·0058	4·6610	4·6351	+ ·0259	6
7	71 0·9	70 57·5	+ 3·4	1·5898	1·5993	− ·0095	4·6210	4·6337	− ·0127	7
8	70 10·9	70 16·7	− 5·8	1·6505	1·6455	+ ·0050	4·5798	4·5903	− ·0105	8
9	71 22·7	71 3·3	+ 19·4	1·5625	1·5937	− ·0312	4·6370	4·6429	− ·0059	9
10	71 32·6	71 34·8	− 2·2	1·5582	1·5608	− ·0026	4·6685	4·6865	− ·0180	10
11	71 32·3	71 33·0	− 0·7	1·5561	1·5633	− ·0072	4·6611	4·6858	− ·0247	11
12	71 9·3	71 8·3	+ 1·0	1·5875	1·5878	− ·0003	4·6513	4·6476	+ ·0037	12
13	71 53·0	71 52·8	+ 0·2	1·5328	1·5386	− ·0058	4·6850	4·7019	− ·0169	13
14	71 41·4	71 53·8	− 12·4	1·5471	1·5381	+ ·0090	4·6753	4·7049	− ·0296	14
15	70 40·9	70 51·1	− 10·2	1·6220	1·6074	+ ·0146	4·6270	4·6292	− ·0022	15
16	70 42·5	70 45·5	− 3·0	1·6224	1·6131	+ ·0093	4·6351	4·6214	+ ·0137	16
17	71 32·1	71 40·5	− 8·4	1·5556	1·5539	+ ·0017	4·6586	4·6916	− ·0330	17
18	70 29·6	70 28·8	+ 0·8	1·6367	1·6341	+ ·0026	4·6202	4·6095	+ ·0107	18
19	..	..	..	..	..	..	..	..	..	19
20*a*	71 31·9	71 34·6	− 2·7	1·5626	1·5608	+ ·0018	4·6788	4·6855	− ·0067	20*a*
20*b*	71 29·0	71 34·6	− 5·6	1·5638	1·5608	+ ·0030	4·6692	4·6855	− ·0163	20*b*
21	70 4·0	70 5·4	− 1·4	1·6583	1·6575	+ ·0008	4·5727	4·5763	− ·0036	21
22	71 18·5	71 15·0	+ 3·5	1·5769	1·5839	− ·0070	4·6610	4·6661	− ·0051	22
23	70 15·5	70 21·4	− 5·9	1·6149	1·6414	+ ·0035	4·5835	4·5985	− ·0150	23
24	71 10·5	71 4·1	+ 6·4	1·5813	1·5933	− ·0120	4·6385	4·6453	− ·0068	24
25	71 15·8	71 18·5	− 2·7	1·5819	1·5773	+ ·0046	4·6637	4·6622	+ ·0015	25
26	72 25·7	71 33·3	+ 52·4	1·5166	1·5637	− ·0471	4·7892	4·6884	+ ·1008	26
27	71 6·0	71 10·6	− 4·6	1·6044	1·5882	+ ·0162	4·6861	4·6592	+ ·0269	27
28	71 14·4	71 21·7	− 7·3	1·5782	1·5735	+ ·0047	4·6465	4·6653	− ·0188	28
29	71 54·6	71 41·2	+ 13·4	1·5655	1·5546	+ ·0109	4·7925	4·6970	+ ·0955	29
30	71 43·3	71 38·7	+ 4·6	1·5477	1·5575	− ·0098	4·6855	4·6943	− ·0088	30
31	71 59·4	71 24·5	+ 34·9	1·5350	1·5755	− ·0405	4·7214	4·6838	+ ·0376	31
32	70 56·2	70 52·5	+ 3·7	1·5972	1·6050	− ·0078	4·6220	4·6284	− ·0064	32
33	70 10·7	70 15·0	− 4·3	1·6580	1·6450	+ ·0130	4·5997	4·5817	+ ·0180	33
34	71 57·1	72 0·5	− 3·4	1·5328	1·5301	+ ·0027	4·7040	4·7115	− ·0075	34
35	70 53·5	70 59·6	− 6·1	1·6007	1·5984	+ ·0023	4·6203	4·6404	− ·0201	35
36	71 11·3	71 15·4	− 4·1	1·5887	1·5814	+ ·0073	4·6636	4·6604	+ ·0032	36
37	71 33·7	71 34·5	− 0·8	1·5420	1·5637	− ·0217	4·6250	4·6938	− ·0688	37
38	70 50·1	71 5·3	− 15·2	1·6038	1·5923	+ ·0115	4·6146	4·6476	− ·0330	38
39	71 37·2	71 40·9	− 3·7	1·5606	1·5540	+ ·0066	4·6968	4·6939	+ ·0029	39
40	70 38·6	70 42·2	− 3·6	1·6401	1·6210	+ ·0191	4·6687	4·6297	+ ·0390	40
41	71 46·9	71 28·7	+ 18·2	1·5549	1·5688	− ·0139	4·7241	4·6827	+ ·0414	41
42	70 26·0	70 28·7	− 2·7	1.6465	1·6345	+ ·0120	4·6324	4·6101	+ ·0223	42
43	70 16·9	70 18·6	− 1·7	1·6453	1·6429	+ ·0024	4·5906	4·5909	− ·0003	43
44	71 18·7	71 24·2	− 5·5	1·5802	1·5707	+ ·0095	4·6716	4·6682	+ ·0034	44
45	70 37·1	70 45·0	− 7·9	1·6350	1·6178	+ ·0172	4·6476	4·6327	+ ·0149	45
46	71 22·8	71 14·2	+ 8·6	1·5682	1·5818	− ·0136	4·6545	4·6562	− ·0017	46
47	70 55·7	70 57·3	− 1·6	1·6022	1·5999	+ ·0023	4·6344	4·6346	− ·0002	47
48	70 32·3	70 44·9	− 12·6	1·6397	1·6157	+ ·0240	4·6401	4·6263	+ ·0138	48
49	72 2·0	72 4·3	− 2·3	1·5343	1·5280	+ ·0063	4·7314	4·7228	+ ·0086	49
50	71 11·7	71 9·8	+ 1·9	1·5919	1·5889	+ ·0030	4·6749	4·6577	+ ·0172	50
51	70 28·3	70 26·7	+ 1·6	1·6351	1·6374	− ·0023	4·6101	4·6097	+ ·0004	51
52	72 39·5	71 26·2	+ 73·3	1·5200	1·5719	− ·0519	4·8677	4·6806	+ ·1871	52
53	70 24·8	70 23·0	+ 1·8	1·6386	1·6412	− ·0026	4·6052	4·6048	+ ·0004	53
54	70 9·1	70 11·0	− 1·9	1·6510	1·6523	− ·0013	4·5737	4·5852	− ·0115	54
55	70 10·2	70 23·1	− 12·9	1·6549	1·6391	+ ·0158	4·5891	4·5994	− ·0103	55
56	71 51·0	71 29·1	+ 21·9	1·5302	1·5702	− ·0400	4·6679	4·6888	− ·0209	56

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

Scotland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
57		Castle Douglas	W	91	54 56 37	3 56 53	20 18·9	20 17·8	+ 1·1	57
58		L. Cheann Chuisil (Lewis)	T	89	58 5 6	7 1 42	22 44·2	23 10·7	− 26·5	58
59		Clonaig (Cantyre)	,,	91	55 45 8	5 23 39	21 44·8	21 21·8	+ 23·0	59
60		Cock Bridge	G	92	57 10 10	3 13 42	20 25·9	20 27·1	− 1·2	60
61		L. Corrie (Argyllshire)	T	89	56 37 6	5 31 6	21 38·3	21 42·0	− 3·7	61
62		Craigendowie	G	92	56 48 38	2 46 50	20 5·3	20 4·7	+ 0·6	62
63	16	Crianlarich	R	84	56 23 25	4 37 6	21 12·8	21 5·0	+ 7·8	63
64	17	Crieff	R & L	85	56 22 27	3 50 22	20 56·6	20 36·6	+ 20·0	64
65		Crieff Junction	G	92	56 16 22	3 43 58	20 22·4	20 31·2	− 8·8	65
66		L. Crinan	T	91	56 5 25	5 33 28	21 50·6	21 34·0	+ 16·6	66
67		Cuil Bay	,,	91	56 38 37	5 17 42	21 24·0	21 34·8	− 10·8	67
68	18	Cumbrae	,,	88	55 47 45	4 53 40	20 59·6	21 4·8	− 5·2	68
69		Cupar	G	92	56 19 12	3 1 30	20 15·9	20 6·5	+ 9·4	69
70		Dalmally	W	91	56 24 4	4 58 8	21 35·6	21 18·3	+ 17·3	70
71	19	Dalwhinnie	R & L	85	56 55 52	4 14 12	21 7·6	21 0·4	+ 7·2	71
72		Dingwall	W	91	57 35 40	4 24 43	20 51·0	21 19·6	− 28·6	72
73		Dinwoodie	G	92	55 11 38	3 24 20	20 11·6	20 3·1	+ 8·5	73
74		Dolphinton	,,	92	55 42 57	3 24 30	20 13·5	20 11·3	+ 2·2	74
75		Island Donnan (L. Alsh)	T	92	57 16 28	5 31 5	22 19·4	21 55·4	+ 24·0	75
76		L. Doon (Dalmellington)	W	91	55 17 25	4 20 45	20 46·1	20 37·3	+ 8·8	76
77		Dufftown	G	92	57 26 35	3 8 0	20 39·5	20 28·1	+ 11·4	77
78		L. Duich	T	89	57 13 24	5 25 6	22 22·7	21 50·2	+ 32·5	78
79	20	Dumfries	R	84 & 85	55 2 10	3 35 30	20 11·4	20 7·3	+ 4·1	79
80		Dunbar	W	91	55 58 38	2 31 33	19 48·2	19 43·5	+ 4·7	80
81		Dunblane	G	92	56 11 6	3 57 40	20 30·4	20 38·0	− 7·6	81
82	21	Dundee	R & T	85	56 28 17	2 56 58	20 7·9	20 5·4	+ 2·5	82
83		Dunkeld	G	92	56 33 43	3 34 55	19 44·7	20 30·0	− 45·3	83
84		Earlston	,,	92	55 38 24	2 40 32	19 43·2	19 44·0	− 0·8	84
85	22	Edinburgh	R & T	85	55 57 52	3 12 28	20 10·9	20 7·4	+ 3·5	85
86	23	Elgin	R	85	57 38 40	3 19 0	20 19·7	20 38·1	− 18·4	86
87		Ellon	W	91	57 21 48	2 4 9	19 48·1	19 46·5	+ 1·6	87
88		Elvanfoot	G	92	55 24 38	3 34 40	20 20·0	20 12·6	+ 7·4	88
89	24	L. Eriboll (Camas Bay)	T	84	58 29 15	4 39 20	21 38·3	21 46·6	− 8·3	89
90		Ewe Island	,,	91	57 50 32	5 38 1	21 6·7	22 10·9	− 64·2	90
91	25	Fairlie	R & T	84	55 45 30	4 51 5	..	..	..	91
92		Falkirk	G	92	55 59 37	3 47 42	20 44·7	20 29·0	+ 15·7	92
93		Forres	W	91	57 35 30	3 39 14	20 51·8	20 50·3	+ 1·5	93
94		Forsinard	,,	91	58 21 48	3 53 35	21 34·5	21 14·3	+ 20·2	94
95	26	Fort Augustus	R & L	85	57 8 30	4 40 32	21 7·1	21 20·5	− 13·4	95
96		Fraserburgh	W	91	57 41 17	2 0 50	20 0·4	19 49·3	+ 11·1	96
97		L. Gair (Argyllshire)	T	91	56 3 32	5 19 46	21 24·1	21 25·1	− 1·0	97
98*a*	27	Gairloch (*a*)	R & T	84	57 42 40	5 40 55	21 34·5	22 11·0	− 36·5	98*a*
98*b*		Gairloch (Flowerdale) (*b*)	T	92	57 42 42	5 41 12	21 58·2	22 11·0	− 12·8	98*b*
99		Girvan	W	91	55 14 35	4 50 7	21 7·2	20 53·4	+ 13·8	99
100		Glamis	G	92	56 37 32	3 1 0	20 17·3	20 10·8	+ 6·5	100
101	28	Glasgow	R	84 & 85	55 52 43	4 17 39	20 34·3	20 44·8	− 10·5	101
102		Glen Afric	T	91	57 20 38	4 46 12	21 6·3	21 28·4	− 22·1	102
103		Glencaird	W	92	55 4 27	4 34 0	20 43·1	20 41·3	+ 1·8	103
104		Glen Tilt (I.)	G	92	56 50 35	3 45 28	20 40·1	20 41·3	− 1·2	104
105		,, ,, (II.)	,,	92	56 57 42	3 38 2	20 25·2	20 38·4	− 13·2	105
106		Glenwhilly	W	92	54 59 54	4 51 23	20 49·7	20 50·0	− 0·3	106
107*a*	29	Golspie	R	85	57 58 42	3 57 52	20 51·5	21 9·4	− 17·9	107*a*
107*b*		Golspie	G	92	57 58 42	3 57 52	20 54·5	21 9·4	− 14·9	107*b*
108		Grant's House	,,	92	55 53 2	2 18 12	19 38·3	19 34·0	+ 4·3	108
109		Greenlaw	W	91	55 41 58	2 23 58	19 38·4	19 35·3	+ 3·1	109
110		Gretna Green	,,	91	55 0 23	3 3 40	19 55·7	19 48·5	+ 7·2	110

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
	° ′	° ′	′							
57	69 57·0	69 59·4	− 2·4	1·6660	1·6643	+ ·0017	4·5649	4·5701	− ·0052	57
58	71 57·4	72 4·5	− 7·1	1·5385	1·5296	+ ·0089	4·7229	4·7288	− ·0059	58
59	70 33·0	70 35·9	− 2·9	1·6120	1·6270	− ·0150	4·5649	4·6198	− ·0549	59
60	71 3·1	71 9·6	− 6·5	1·5919	1·5871	+ ·0048	4·6368	4·6514	− ·0146	60
61	71 8·1	71 5·3	+ 2·8	1·5939	1·5940	− ·0001	4·6647	4·6526	+ ·0121	61
62	70 44·4	70 54·3	− 9·9	1·6131	1·6031	+ ·0100	4·6166	4·6307	− ·0141	62
63	70 47·1	70 52·5	− 5·4	1·6083	1·6080	+ ·0003	4·6146	4·6371	− ·0225	63
64	70 48·3	70 47·1	+ 1·2	1·6180	1·6128	+ ·0052	4·6476	4·6274	+ ·0202	64
65	70 53·3	70 42·6	+ 10·7	1·5991	1·6174	− ·0183	4·6149	4·6213	− ·0064	65
66	70 42·3	70 48·2	− 5·9	1·6170	1·6136	+ ·0034	4·6187	4·6346	− ·0159	66
67	71 0·9	71 4·4	− 3·5	1·6007	1·5946	+ ·0061	4·6528	4·6500	+ ·0028	67
68	70 56·6	70 34·4	+ 22·2	1·6015	1·6278	− ·0263	4·6363	4·6155	+ ·0208	68
69	70 43·1	70 40·0	+ 3·1	1·6194	1·6194	·0000	4·6290	4·6156	+ ·0134	69
70	70 38·3	70 54·9	− 16·6	1·6246	1·6056	+ ·0190	4·6232	4·6407	− ·0175	70
71	70 54·9	71 7·8	− 12·9	1·6011	1·5905	+ ·0106	4·6276	4·6534	− ·0258	71
72	71 44·4	71 31·0	+ 13·4	1·5440	1·5647	− ·0207	4·6796	4·6809	− ·0013	72
73	69 58·5	70 4·4	− 5·9	1·6630	1·6580	+ ·0050	4·5629	4·5735	− ·0106	73
74	70 16·2	70 22·3	− 6·1	1·6481	1·6391	+ ·0090	4·5954	4·5960	− ·0006	74
75	71 34·5	71 27·3	+ 7·2	1·5585	1·5698	− ·0113	4·6782	4·6794	− ·0012	75
76	70 7·0	70 14·3	− 7·3	1·6553	1·6493	+ ·0060	4·5769	4·5907	− ·0138	76
77	71 16·5	71 18·0	− 1·5	1·5907	1·5778	+ ·0129	4·6928	4·6614	+ ·0314	77
78	71 26·1	71 25·1	+ 1·0	1·5762	1·5724	+ ·0038	4·6930	4·6772	+ ·0158	78
79	69 56·9	70 0·5	− 3·6	1·6644	1·6629	+ ·0015	4·5602	4·5709	− ·0107	79
80	70 22·6	70 25·7	− 3·1	1·6356	1·6345	+ ·0011	4·5874	4·5974	− ·0100	80
81	70 46·5	70 41·2	+ 5·3	1·6061	1·6193	− ·0132	4·6055	4·6206	− ·0151	81
82	70 47·1	70 44·7	+ 2·4	1·6101	1·6145	− ·0044	4·6197	4·6220	− ·0023	82
83	71 2·0	70 51·3	+ 10·7	1·5943	1·6077	− ·0134	4·6390	4·6311	+ ·0079	83
84	70 14·3	70 15·3	− 1·0	1·6469	1·6459	+ ·0010	4·5841	4·5854	− ·0013	84
85	70 33·1	70 29·4	+ 3·7	1·6283	1·6313	− ·0030	4·6114	4·6040	+ ·0074	85
86	71 27·2	71 25·9	+ 1·3	1·5677	1·5695	− ·0018	4·6726	4·6722	+ ·0004	86
87	71 10·7	71 8·4	+ 2·3	1·5830	1·5871	− ·0041	4·6443	4·6460	− ·0017	87
88	70 18·3	70 12·9	+ 5·4	1·6433	1·6493	− ·0060	4·5908	4·5849	+ ·0059	88
89	72 4·7	72 1·9	+ 2·8	1·5300	1·5291	+ ·0009	4·7309	4·7150	+ ·0159	89
90	71 44·8	71 46·8	− 2·0	1·5403	1·5478	− ·0075	4·6707	4·7021	− ·0314	90
91	70 37·1	70 32·5	+ 4·6	1·6276	1·6301	− ·0025	4·6266	4·6139	+ ·0127	91
92	71 2·6	70 34·0	+ 28·6	1·5861	1·6272	− ·0411	4·6177	4·6121	+ ·0056	92
93	71 23·7	71 26·3	− 2·6	1·5725	1·5692	+ ·0033	4·6712	4·6732	− ·0020	93
94	71 47·2	71 53·2	− 6·0	1·5486	1·5384	+ ·0102	4·7064	4·7030	+ ·0034	94
95	71 22·5	71 17·7	+ 4·8	1·5744	1·5799	− ·0055	4·6715	4·6662	+ ·0053	95
96	71 22·4	71 19·2	+ 3·2	1·5687	1·5752	− ·0065	4·6541	4·6591	− ·0050	96
97	70 45·4	70 45·9	− 0·5	1·6038	1·6160	− ·0122	4·5942	4·6314	− ·0372	97
98*a*	71 38·8	71 43·0	− 4·2	1·5458	1·5523	− ·0065	4·6595	4·6984	− ·0389	98*a*
98*b*	71 40·9	71 43·0	− 2·1	1·5386	1·5523	− ·0137	4·6474	4·6984	− ·0510	98*b*
99	70 9·1	70 15·3	− 6·2	1·6542	1·6486	+ ·0056	4·5826	4·5930	− ·0104	99
100	70 49·8	70 50·2	− 0·4	1·6081	1·6083	− ·0002	4·6256	4·6280	− ·0024	100
101	70 39·1	70 33·3	+ 5·8	1·6167	1·6286	− ·0119	4·6042	4·6131	− ·0089	101
102	71 36·4	71 24·9	+ 11·5	1·5582	1·5723	− ·0141	4·6860	4·6762	+ ·0098	102
103	70 10·2	70 7·8	+ 2·4	1·6494	1·6563	− ·0069	4·5739	4·5830	− ·0091	103
104	70 38·6	71 1·5	− 22·9	1·6292	1·5965	+ ·0327	4·6376	4·6432	− ·0056	104
105	70 50·5	71 5·0	− 14·5	1·6092	1·5928	+ ·0164	4·6319	4·6477	− ·0158	105
106	70 7·7	70 7·4	+ 0·3	1·6534	1·6572	− ·0038	4·5746	4·5837	− ·0091	106
107*a*	71 42·0	71 41·2	+ 0·8	1·5483	1·5528	− ·0045	4·6817	4·6916	− ·0099	107*a*
107*b*	71 44·2	71 41·2	+ 3·0	1·5461	1·5528	− ·0067	4·6850	4·6916	− ·0066	107*b*
108	70 24·4	70 20·8	+ 3·6	1·6352	1·6391	− ·0039	4·5939	4·5897	+ ·0042	108
109	70 12·7	70 15·3	− 2·6	1·6472	1·6452	+ ·0020	4·5783	4·5835	− ·0052	109
110	69 57·2	69 56·0	+ 1·2	1·6638	1·6664	− ·0026	4·5597	4·5618	− ·0021	110

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

Scotland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
111		Halkirk	G	92	58 30 16	3 29 13	20 52·0	21 0·9	− 8·9	111
112		Hamilton	W	91	55 46 32	4 1 15	20 32·5	20 33·6	− 1·1	112
113	30	Hawick	R & T	85	55 25 58	2 47 58	19 40·4	19 45·6	− 5·2	113
114		Helmsdale	W	91	58 8 18	3 40 22	21 0·6	21 1·2	− 0·6	114
115		Heriot	,,	91	55 46 50	2 57 25	19 53·2	19 56·0	− 2·8	115
116		L. Hourn	T	89	57 7 0	5 25 1	21 45·2	21 48·1	− 2·9	116
117		Huntly	W	91	57 26 58	2 47 26	20 45·4	20 15·5	+ 29·9	117
118		Inchmarnock	T	91	55 48 16	5 9 41	21 5·1	21 14·5	− 9·4	118
119	31	L. Inver	R & T	84	58 9 30	5 14 40	21 27·5	22 3·0	− 35·5	119
120		Inverary	T	91	56 14 37	5 3 25	21 13·5	21 18·7	− 5·2	120
121	32	Inverness	R & L	85	57 28 30	4 13 20	21 4·9	21 9·6	− 4·7	121
122		Inverurie	W	91	57 16 43	2 22 29	20 37·8	19 56·9	+ 40·9	122
123	33	Iona	R	84	56 20 0	6 23 40	22 49·2	22 8·5	+ 40·7	123
124		Jedburgh	W	91	55 28 28	2 32 52	19 27·5	19 37·6	− 10·1	124
125		Keith	G	92	57 32 22	2 57 13	21 11·8	20 22·9	+ 48·9	125
126		Kelso	,,	92	55 36 32	2 25 56	20 2·3	19 35·2	+ 27·1	126
127		Kennethmont	,,	92	57 21 6	2 44 22	20 21·3	20 12·0	+ 9·3	127
128		Kilconquhar	,,	92	56 12 8	2 50 28	20 1·8	19 57·8	+ 4·0	128
129		Kildonan	,,	92	58 10 14	3 51 54	20 49·6	21 9·6	− 20·0	129
130		Killin	W	91	56 28 8	4 19 5	20 55·4	20 55·6	− 0·2	130
131		Kinbrace	G	92	58 15 37	3 56 27	21 8·0	21 14·2	− 6·2	131
132		Kingussie	W	91	57 4 58	4 2 58	20 35·2	20 56·4	− 21·2	132
133		Kinloch Aline	T	91	56 33 49	5 44 55	21 30·6	21 49·4	− 18·8	133
134		,, Eil	,,	91	56 51 18	5 17 1	21 29·0	21 37·9	− 8·9	134
135		Kinlochewe	,,	92	57 36 16	5 17 53	21 36·6	21 53·7	− 17·1	135
136		Kinross	W	91	56 12 20	3 25 5	20 6·6	20 18·8	− 12·2	136
137		Kirkcaldy	G	92	56 6 40	3 9 28	20 9·7	20 8·0	+ 1·7	137
138		Kirkcudbright	W	92	54 50 8	4 3 24	20 17·8	20 20·0	− 2·2	138
139	34	Kirkwall	T	85	58 59 12	2 57 15	20 50·4	20 48·7	+ 1·7	139
140		Kirriemuir	W	91	56 40 42	3 0 15	20 18·2	20 10·8	+ 7·4	140
141*a*	35	Kyle Akin (*a*)	R & T	84	57 16 35	5 44 0	22 30·9	22 2·9	+ 28·0	141*a*
141*b*		,, ,, (*b*)	T	92	57 16 26	5 44 12	22 29·2	22 2·9	+ 26·3	141*b*
142*a*	36	Lairg (*a*)	R	85	58 1 30	4 24 0	21 11·2	21 27·1	− 15·9	142*a*
142*b*		,, (*b*)	G	92	58 1 20	4 24 2	21 18·5	21 27·1	− 8·6	142*b*
142*c*		,, (*c*)	,,	92	58 1 20	4 24 2				142*c*
143		Langholm	,,	92	55 9 20	3 0 0	19 49·2	19 48·6	+ 0·6	143
144		Leadburn	,,	92	55 47 8	3 13 6	19 41·0	20 5·5	− 24·5	144
145	37	Lerwick	T	85	60 8 53	1 7 47	19 51·2	..	..	145
146		L. Leven	,,	91	56 42 9	5 3 8	21 30·9	21 26·7	+ 4·2	146
147	38	Lochgoilhead	,,	88	56 10 20	4 54 0	21 16·2	21 11·3	+ 4·9	147
148		L. Lochy	,,	91	56 57 11	4 55 17	21 46·6	21 26·2	+ 20·4	148
149		Lockerbie	W	91	55 7 21	3 21 28	20 3·3	20 0·4	+ 2·9	149
150		Lowlander's Bay (L. Skiport)	T	89	57 19 36	7 16 18	23 48·0*	23 2·3	+ 45·7	150
151		Lowlandman's Bay (Jura)	,,	91	55 53 5	5 54 0	22 12·7	21 42·0	+ 30·7	151
152		McCormack Bay (L. Skiport)	T	89	57 20 0	7 15 48	22 2·9*	23 3·0	− 60·1	152
153*a*	39	L. Maddy (*a*)	R & T	84	57 35 50	7 9 0	22 37·0	23 4·6	− 27·6	153*a*
153*b*		,, ,, (*b*)	T	89	57 36 0	7 9 36	22 42·6	23 4·6	− 22·0	153*b*
154		Mallaig (L. Nevis)	,,	92	57 0 19	5 49 17	22 21·1	22 1·0	+ 20·1	154
155		L. Melfort	,,	91	56 16 7	5 30 32	21 15·1	21 35·4	− 20·3	155
156		Moffat	G	92	55 19 55	3 26 44	20 16·1	20 6·5	+ 9·6	156
157		Monikie	,,	92	56 32 12	2 48 37	19 37·5	20 1·6	− 24·1	157
158		Montrose	W	91	56 43 24	2 27 18	19 48·6	19 51·7	− 3·1	158
159		L. More	G	92	58 15 55	4 49 0	21 27·8	21 48·9	− 21·1	159

* The mean of the Declinations at Lowlander's Bay and McCormack's Bay is entered in Map 5.

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
111	71° 54′·7	71° 55′·3	− 0′·6	1·5301	1·5358	− ·0057	4·6846	4·7048	− ·0202	111
112	70 23·0	70 28·3	− 5·3	1·6413	1·6336	+ ·0077	4·6051	4·6060	− ·0009	112
113	70 1·9	70 9·0	− 7·1	1·6586	1·6528	+ ·0058	4·5648	4·5783	− ·0135	113
114	71 58·1	71 44·6	+ 13·5	1·5300	1·5483	− ·0183	4·6999	4·6935	+ ·0064	114
115	70 19·3	70 21·6	− 2·3	1·6404	1·6393	+ ·0011	4·5869	4·5936	− ·0067	115
116	71 25·2	71 21·6	+ 3·6	1·5697	1·5764	− ·0067	4·6697	4·6734	− ·0037	116
117	71 8·7	71 16·0	− 7·3	1·5854	1·5794	+ ·0060	4·6425	4·6572	− ·0117	117
118	..	..	..	..	..	..	..	..	..	118
119	71 55·3	71 54·8	+ 0·5	1·5094	1·5380	− ·0286	4·6239	4·7092	− ·0853	119
120	70 44·8	70 49·9	− 5·1	1·6118	1·6110	+ ·0008	4·6148	4·6345	− ·0197	120
121	71 26·2	71 25·9	+ 0·3	1·5744	1·5704	+ ·0040	4·6881	4·6749	+ ·0132	121
122	71 3·4	71 7·6	− 4·2	1·5966	1·5881	+ ·0085	4·6518	4·6456	+ ·0062	122
123	70 50·0	71 1·6	− 11·6	1·6293	1·5998	+ ·0295	4·6875	4·6533	+ ·0342	123
124	70 6·3	70 8·4	− 2·1	1·6577	1·6527	+ ·0050	4·5807	4·5755	+ ·0052	124
125	71 16·2	71 20·2	− 4·0	1·5807	1·5752	+ ·0055	4·6619	4·6636	− ·0017	125
126	70 27·8	70 12·4	+ 15·4	1·6355	1·6481	− ·0126	4·6091	4·5794	+ ·0297	126
127	71 28·7	71 12·5	+ 16·2	1·5599	1·5835	− ·0236	4·6562	4·6537	+ ·0025	127
128	70 36·1	70 34·9	+ 1·2	1·6202	1·6248	− ·0046	4·6013	4·6091	− ·0078	128
129	71 45·3	71 46·8	− 1·5	1·5403	1·5461	− ·0058	4·6725	4·6970	− ·0245	129
130	70 49·4	70 53·1	− 3·7	1·6028	1·6068	− ·0040	4·6086	4·6363	− ·0277	130
131	71 46·3	71 50·2	− 3·9	1·5426	1·5413	+ ·0013	4·6840	4·6981	− ·0141	131
132	70 58·0	71 11·8	− 13·8	1·6038	1·5858	+ ·0180	4·6490	4·6575	− ·0085	132
133	71 5·8	71 4·6	+ 1·2	1·5996	1·5952	+ ·0044	4·6712	4·6531	+ ·0181	133
134	71 18·9	71 11·7	+ 7·2	1·5818	1·5871	− ·0053	4·6772	4·6608	+ ·0164	134
135	71 35·1	71 36·9	− 1·8	1·5607	1·5586	+ ·0021	4·6875	4·6894	− ·0019	135
136	70 38·6	70 38·9	− 0·3	1·6246	1·6213	+ ·0033	4·6246	4·6164	+ ·0082	136
137	70 45·7	70 33·9	+ 11·8	1·6100	1·6263	− ·0163	4·6134	4·6091	+ ·0043	137
138	69 53·7	69 56·6	− 2·9	1·6695	1·6673	+ ·0022	4·5609	4·5668	− ·0059	138
139	72 8·5	72 7·5	+ 1·0	1·5206	1·5208	− ·0002	4·7197	4·7155	+ ·0042	139
140	70 46·6	70 51·7	− 5·1	1·6121	1·6066	+ ·0055	4·6233	4·6296	− ·0063	140
141*a*	71 33·2	71 28·8	+ 4·4	1·5571	1·5685	− ·0114	4·6681	4·6823	− ·0142	141*a*
141*b*	71 36·5	71 28·8	+ 7·7	1·5533	1·5685	− ·0152	4·6718	4·6823	− ·0105	141*b*
142*a*	71 45·5	71 45·2	+ 0·3	1·5458	1·5485	− ·0027	4·6901	4·6969	− ·0068	142*a*
142*b* 142*c*	} 71 48·2	71 45·2	+ 3·0	1·5402	1·5485	− ·0077	4·6874	4·6969	− ·0095 {	142*b* 142*c*
143	69 59·9	70 0·7	− 0·8	1·6613	1·6614	− ·0001	4·5639	4·5675	− ·0036	143
144	70 25·2	70 23·6	+ 1·6	1·6364	1·6375	− ·0011	4·6007	4·5970	+ ·0037	144
145	72 43·7	..	..	1·4804	..	..	4·7614	..	..	145
146	70 39·9	71 5·0	− 25·1	1·6274	1·5941	+ ·0333	4·6381	4·6516	− ·0135	146
147	70 40·5	70 46·9	− 6·4	1·6125	1·6142	− ·0017	4·5982	4·6306	− ·0324	147
148	71 13·8	71 12·7	+ 1·1	1·5933	1·5856	+ ·0077	4·6883	4·6608	+ ·0275	148
149	69 58·4	70 1·6	− 3·2	1·6655	1·6606	+ ·0049	4·5693	4·5691	+ ·0002	149
150	71 23·5	71 40·0	− 16·5	1·5641	1·5572	+ 0069	4·6454	4·6993	− ·0539	150
151	70 34·8	70 43·5	− 8·7	1·6294	1·6194	+ ·0100	4·6218	4·6307	− ·0089	151
152	..	..	..	1·5612	1·5570	+ ·0042	..	..	..	152
153*a*	71 46·6	71 46·5	+ 0·1	1·5474	1·5470	+ ·0004	4·6999	4·6983	+ ·0016	153*a*
153*b*	..	..	..	1·5565	1·5470	+ ·0095	..	..	..	153*b*
154	71 29·1	71 20·6	+ 8·5	1·5569	1·5780	− ·0211	4·6490	4·6737	− ·0247	154
155	70 38·2	70 53·6	− 15·4	1·6230	1·6072	+ ·0158	4·6182	4·6396	− ·0214	155
156	70 8·0	70 9·4	− 1·4	1·6523	1·6528	− ·0005	4·5728	4·5799	− ·0071	156
157	70 42·3	70 45·7	− 3·4	1·6185	1·6127	+ ·0058	4·6230	4·6210	+ ·0020	157
158	70 47·4	70 49·7	− 2·3	1·6111	1·6082	+ ·0029	4·6238	4·6255	− ·0017	158
159	71 42·8	71 55·9	− 13·1	1·5435	1·5361	+ ·0074	4·6708	4·7086	− ·0378	159

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal, and

Scotland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
160		L. Nevis	T	89	56 59 0	5 35 54	22 11·3	21 52·2	+ 19·1	160
161		New Cumnock	W	91	55 23 50	4 11 12	20 25·0	20 33·5	– 8·5	161
162		,, Galloway	,,	91	55 5 7	4 6 58	20 20·8	20 25·9	– 5·1	162
163		Newmilns	,,	91	55 36 24	4 17 30	20 51·3	20 40·7	+ 10·6	163
164*a*		Newton Stewart (*a*)	,,	91	54 57 31	4 29 31	20 36·1	20 36·3	– 0·2	164*a*
164*b*		,, ,, (*b*)	,,	91	54 57 31	4 29 31	..	..	..	164*b*
165*a*	40*a*	Oban (*a*)	T	85–88	56 25 9	5 28 30	21 30·8	21 36·8	– 6·0	165*a*
165*b*	40*b*	,, (Kerrera) (*b*)	R & T	84, 85	56 25 20	5 30 0	21 33·3	21 37·8	– 4·5	165*b*
166		Ord (L. Eishort)	T	92	57 8 45	5 56 30	22 35·6	22 8·4	+ 27·2	166
167		Ornsay (Skye)	,,	91	57 8 48	5 47 29	21 37·3	22 2·8	– 25·5	167
168		Oronsay	,,	92	56 1 1	6 13 59	22 0·8	21 56·5	+ 4·3	168
169		Overscaig Inn	W	91	58 10 5	4 41 35	21 16·8	21 41·7	– 24·9	169
170		Parton	W	92	55 0 34	4 2 48	20 23·8	20 22·5	+ 1·3	170
171		Peebles	,,	91	55 37 56	3 10 58	20 2·6	20 1·8	+ 0·8	171
172		Penwherry	,,	92	55 8 50	4 49 50	20 49·2	20 51·6	– 2·4	172
173		Persie Hotel	G	92	56 40 48	3 24 20	20 28·1	20 26·2	+ 1·9	173
174		Perth	W	91	56 25 12	3 28 28	20 13·8	20 23·8	– 10·0	174
175		Pinvalley	,,	92	55 13 15	4 37 20	21 4·2	20 45·6	+ 18·6	175
176	41	Pitlochrie	R & L	85	56 42 7	3 43 26	20 30·9	20 37·5	– 6·6	176
177		Poolewe	T	91	57 46 5	5 36 20	21 38·5	22 8·7	– 30·2	177
178	42	Port Askaig (Islay)	R & T	84	55 50 40	6 6 55	22 22·1	21 49·1	+ 33·0	178
179		,, Ellen	T	91	55 37 30	6 11 5	21 39·8	21 47·2	– 7·4	179
180		,, of Ness	,,	89	58 29 24	6 13 30	22 50·9	22 48·7	+ 2·2	180
181		,, Patrick	W	91	54 51 0	5 6 33	20 54·7	20 55·9	– 1·2	181
182*a*	43*a*	Portree (*a*)	T	88	57 24 35	6 11 40	24 21·1	22 23·1	+118·0	182*a*
182*b*	43*b*	,, (*b*)	,,	88	57 24 10	6 11 5	22 5·6	22 22·6	– 17·0	182*b*
182*c*	43*c*	,, (*c*)	,,	88	57 24 15	6 11 50	19 34·3	22 23·0	–168·7	182*c*
183		Raasay	T	92	57 20 7	6 1 10	23 18·1	22 15·3	+ 62·8	183
184		L. Rannoch	W	91	56 41 30	4 24 40	21 41·9	21 3·2	+ 38·7	184
185*a*		L. Ranza (*a*)	T	91	55 42 23	5 18 0	21 16·4	21 17·4	– 1·0	185*a*
185*b*		,, ,, (*b*)	,,	91	55 42 18	5 17 24	21 4·3	21 17·9	– 13·6	185*b*
186		Riccarton Junction	W	91	55 16 12	2 43 15	19 39·5	19 39·7	– 0·2	186
187		L. Riddan	T	91	55 57 25	5 11 54	21 17·7	21 18·5	– 0·8	187
188		East L. Roag (Lewis)	,,	89	58 12 30	6 47 12	..	..	..	188
189		Rodel (Harris)	,,	89	57 44 18	6 57 30	20 16·7	23 0·0	–163·3	189
190		Rona (South)	,,	92	57 32 22	5 59 10	22 13·9	22 18·5	– 4·6	190
191		Ronachan (Cantire)	,,	92	55 44 15	5 35 43	21 19·0	21 28·7	– 9·7	191
192	44	Row (Gairloch)	,,	88	56 1 0	4 46 50	21 10·0	21 4·5	+ 5·5	192
193		Rum	,,	92	57 2 50	6 17 50	22 2·8	22 19·7	– 16·9	193
194		Ruthwell	W	92	55 0 46	3 25 0	20 1·5	20 0·9	+ 0·6	194
195		Saint Andrews	,,	91	56 20 23	2 50 10	20 11·0	20 0·0	+ 11·0	195
196		Saint Mary's Loch	,,	91	55 28 25	3 11 50	20 3·8	19 59·9	+ 3·9	196
197		Saint Ninian's Bay (Bute)	T	91	55 48 15	5 8 6	..	..	..	197
198		Salen (L. Sunart)	,,	91	56 42 33	5 46 40	21 28·6	21 53·5	– 24·9	198
199		Sandag Bay (L. Hourn)	,,	92	57 10 11	5 41 19	23 8·6	21 59·5	+ 69·1	199
200		Sanquhar	W	92	55 21 58	3 55 30	20 20·0	20 23·7	– 3·7	200
201	45	Scarnish (Tiree)	R & L	85	56 30 12	6 47 20	23 48·1	22 26·3	+ 81·8	201
202		Scoraig	T	91	57 54 38	5 22 36	20 46·0	22 3·0	– 77·0	202
203		Scourie	W	91	58 21 5	5 8 43	23 53·6	22 3·5	+110·1	203
204		Selkirk	,,	91	55 32 42	2 50 25	19 42·4	19 48·4	– 6·0	204
205		L. Shin (1)	G	92	58 5 40	4 29 18	21 35·0	21 32·0	+ 3·0	205
206		,, 2)	,,	92	58 8 30	4 35 12	21 40·2	21 37·1	+ 3·1	206
207		L. Slapin	T	92	57 12 37	6 1 55	20 46·4	22 13·0	– 86·6	207
208		L. Sligachan	,,	92	57 18 39	6 7 31	21 43·9	22 18·9	– 35·0	208
209	46	Soa (Skye)	R & T	84	57 9 45	6 10 12	22 35·2	22 17·1	+ 18·1	209

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
	° ′	° ′	′							
160	71 24·7	71 18·3	+ 6·4	1·5703	1·5804	− ·0101	4·6692	4·6705	− ·0013	160
161	70 15·4	70 16·6	− 1·2	1·6450	1·6463	− ·0013	4·5834	4·5921	− ·0087	161
162	70 7·1	70 5·5	+ 1·6	1·6570	1·6580	− ·0010	4·5819	4·5780	+ ·0039	162
163	70 45·0	70 24·0	+ 21·0	1·6273	1·6385	− ·0112	4·6599	4·6015	+ ·0584	163
164*a*	70 6·3	70 3·6	+ 2·7	1·6617	1·6606	+ ·0011	4·5917	4·5774	+ ·0143	164*a*
164*b*	70 6·5	70 3·6	+ 2·9	1·6571	1·6606	− ·0035	4·5798	4·5774	+ ·0024	164*b*
165*a*	70 47·6	70 58·7	− 11·1	1·6150	1·6023	+ ·0127	4·6360	4·6477	− ·0117	165*a*
165*b*	70 43·2	70 59·0	− 15·8	1·6209	1·6015	+ ·0194	4·6338	4·6468	− ·0130	165*b*
166	71 27·9	71 26·0	+ 1·9	1·5644	1·5720	− ·0076	4·6661	4·6800	− ·0139	166
167	71 57·3	71 25·0	+ 32·3	1·5340	1·5727	− ·0387	4·7087	4·6778	+ ·0309	167
168	70 58·6	70 50·1	+ 8·5	1·6013	1·6124	− ·0111	4·6444	4·6393	+ ·0051	168
169	71 51·3	71 51·7	− 0·4	1·5529	1·5409	+ ·0120	4·7385	4·7038	+ ·0347	169
170	70 2·9	70 2·4	+ 0·5	1·6581	1·6612	− ·0031	4·5675	4·5740	− ·0065	170
171	70 15·7	70 17·9	− 2·2	1·6446	1·6435	+ ·0011	4·5835	4·5897	− ·0062	171
172	69 52·4	70 12·2	− 19·8	1·6886	1·6519	+ ·0367	4·6078	4·5891	+ ·0187	172
173	71 2·6	70 54·0	+ 8·6	1·5873	1·6042	− ·0169	4·6213	4·6327	− ·0114	173
174	70 46·6	70 46·0	+ 0·6	1·6078	1·6134	− ·0056	4·6111	4·6243	− ·0132	174
175	70 4·6	70 13·2	− 8·6	1·6672	1·6503	+ ·0169	4·5997	4·5889	+ ·0108	175
176	70 52·3	70 57·2	− 4·9	1·6000	1·6016	− ·0016	4·6131	4·6391	− ·0260	176
177	71 41·8	71 44·4	− 2·6	1·5448	1·5508	− ·0060	4·6701	4·7001	− ·0300	177
178	70 30·3	70 43·5	− 13·2	1·6447	1·6189	+ ·0258	4·6458	4·6295	+ ·0163	178
179	70 18·6	70 36·7	− 18·1	1·6545	1·6272	+ ·0273	4·6234	4·6237	− ·0003	179
180	72 6·9	72 11·5	− 4·6	1·5245	1·5185	+ ·0060	4·7241	4·7271	− ·0030	180
181	70 5·2	70 3·8	+ 1·4	1·6575	1·6613	− ·0038	4·5754	4·5802	− ·0048	181
182*a*	72 13·1	71 36·0	+ 37·1	1·5284	1·5610	− ·0326	4·7656	4·6925	+ ·0731	182*a*
182*b*	71 3·3	71 36·0	− 32·7	1·5983	1·5610	+ ·0373	4·6563	4·6925	− ·0362	182*b*
182*c*	72 31·3	71 36·0	+ 55·3	1·5318	1·5610	− ·0292	4·8646	4·6925	+ ·1721	182*c*
183	71 52·9	71 32·7	+ 20·2	1·5245	1·5643	− ·0398	4·6592	4·6874	− ·0282	183
184	70 50·9	71 0·4	− 9·5	1·6081	1·5986	+ ·0095	4·6304	4·6444	− ·0140	184
185*a*	70 59·5	70 33·6	+ 25·9	1·5893	1·6293	− ·0400	4·6134	4·6164	− ·0030	185*a*
185*b*	70 54·6	70 34·0	+ 20·6	1·5970	1·6290	− ·0320	4·6144	4·6172	− ·0028	185*b*
186	69 58·6	70 2·8	− 4·2	1·6608	1·6588	+ ·0020	4·5572	4·5690	− ·0118	186
187	70 33·1	70 41·7	− 8·6	1·6205	1·6204	+ ·0001	4·5893	4·6258	− ·0365	187
188	72 4·9	72 5·6	− 0·7	1·5227	1·5240	− ·0013	4·7092	4·7168	− ·0076	188
189	71 34·6	71 51·6	− 17·0	1·5725	1·5436	+ ·0289	4·7206	4·7115	+ ·0091	189
190	71 45·1	71 39·2	+ 5·9	1·5425	1·5569	− ·0144	4·6782	4·6947	− ·0165	190
191	70 33·7	70 36·9	− 3·2	1·6282	1·6262	+ ·0020	4·6137	4·6217	− ·0080	191
192	70 45·3	70 40·9	+ 4·4	1·6082	1·6214	− ·0132	4·6065	4·6253	− ·0188	192
193	71 38·1	71 25·0	+ 13·1	1·5623	1·5736	− ·0113	4·7060	4·6804	+ ·0256	193
194	69 55·9	69 58·3	− 2·4	1·6660	1·6645	+ ·0015	4·5604	4·5662	− ·0058	194
195	70 37·1	70 39·5	− 2·4	1·6211	1·6196	+ ·0015	4·6081	4·6141	− ·0060	195
196	70 8·1	70 12·6	− 4·5	1·6533	1·6492	+ ·0041	4·5759	4·5833	− ·0074	196
197	70 42·7	70 36·1	+ 6·6	1·6142	1·6267	− ·0125	4·6124	4·6198	− ·0074	197
198	71 6·0	71 9·8	− 3·8	1·5966	1·5894	+ ·0072	4·6632	4·6591	+ ·0041	198
199	71 35·4	71 25·0	+ 10·4	1·5586	1·5728	− ·0142	4·6825	4·6780	+ ·0045	199
200	70 14·3	70 13·8	+ 0·5	1·6468	1·6489	− ·0021	4·5837	4·5874	− ·0037	200
201	71 13·7	71 9·9	+ 3·8	1·6018	1·5912	+ ·0106	4·7129	4·6648	+ ·0481	201
202	71 36·8	71 47·7	− 10·9	1·5800	1·5467	+ ·0333	4·7533	4·7029	+ ·0504	202
203	71 54·1	72 0·5	− 6·4	1·5211	1·5308	− ·0097	4·6543	4·7137	− ·0594	203
204	70 8·5	70 13·0	− 4·5	1·6547	1·6483	+ ·0066	4·5815	4·5826	− ·0011	204
205	71 50·2	71 48·1	+ 2·1	1·5297	1·5455	− ·0158	4·6627	4·7011	− ·0384	205
206	71 49·6	71 50·3	− 0·7	1·5354	1·5426	− ·0072	4·6772	4·7024	− ·0252	206
207	71 27·8	71 28·5	− 0·7	1·5762	1·5691	+ ·0071	4·7008	4·6827	+ ·0181	207
208	72 9·3	71 32·4	+ 36·9	1·5235	1·5648	− ·0413	4·7324	4·6876	+ ·0448	208
209	71 54·2	71 27·8	+ 26·4	1·5179	1·5696	− ·0517	4·6446	4·6811	− ·0365	209

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

Scotland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
210		Soa (Skye)	T	92	57 9 48	6 11 43	22 35·4	22 18·3	+ 17·1	210
211		L. Spelve (Mull)	”	91	56 21 55	5 47 31	21 57·6	21 47·7	+ 9·9	211
212		Spital of Glenshee	G	92	56 48 42	3 27 18	20 8·4	20 30·0	− 21·6	212
213		L. Stack	”	92	58 20 27	4 56 42	20 57·6	21 55·5	− 57·9	213
214		L. Staffin	T	92	57 39 19	6 14 19	22 0·9	22 30·8	− 29·9	214
215		Stanley Junction	G	92	56 29 12	3 26 22	20 18·0	20 23·7	− 5·7	215
216	47	Stirling	R	85	56 7 2	3 56 55	20 51·5	20 36·3	+ 15·2	216
217		Stonehaven	W	91	56 58 1	2 14 18	19 45·2	19 46·9	− 1·7	217
218*a*	48*a*	Stornoway (Ard Point) . .	R & T	84, 85, 88	58 12 10	6 23 40	23 35·4	22 48·9	+ 46·5	218*a*
218*b*	48*b*	” Castle	”	84	58 12 40	6 23 35	23 26·7	22 49·0	+ 37·7	218*b*
219	49	Strachur	”	84	56 10 20	5 4 40	21 10·8	21 17·8	− 7·0	219
220*a*	50	Stranraer (*a*)	R	84	54 54 25	5 2 10	20 57·9	20 54·6	+ 3·3	220*a*
220*b*		” (*b*)	R & T	88	54 54 25	5 2 10				220*b*
221		L. Striven	T	91	56 0 12	5 7 36	. .	. .	. .	221
222		Strome Ferry	”	91	57 21 5	5 33 8	22 9·9	21 58·0	+ 11·9	222
223	51	Stromness	”	85	58 57 30	3 17 12	20 48·7	21 1·7	− 13·0	223
224		Tain	W	91	57 50 0	4 6 58	20 56·5	21 12·8	− 16·3	224
225		Talladale (Loch Maree) . .	T	92	57 40 31	5 29 42	22 43·8	22 2·6	+ 41·2	225
226		Tanera More (Summer Isles)	”	91	58 0 35	5 24 10	22 1·4	22 5·7	− 4·3	226
227	52	East L. Tarbert (L. Fyne) .	R & T	86	55 51 56	5 24 25	21 26·2	21 24·2	+ 2·0	227
228		West L. Tarbert	T	89	57 54 0	6 49 0	22 57·0	22 58·0	− 1·0	228
229		Tarbet	W	91	56 12 12	4 42 28	21 3·0	21 5·4	− 2·4	229
230		Temple (Urquhart) . . .	T	91	57 20 14	4 26 42	21 13·2	21 15·6	− 2·4	230
231		Thornhill	W	91	55 14 40	3 45 52	20 14·5	20 16·0	− 1·5	231
232*a*	53	Thurso (*a*)	R	85	58 35 30	3 31 15	20 59·5	21 3·9	− 4·4	232*a*
232*b*		” (*b*)	G	92	58 35 30	3 31 8	20 57·0	21 3·9	− 6·9	232*b*
233		L. Torridon	T	91	57 32 1	5 32 40	21 48·5	22 1·0	− 12·5	233
234		Torrisdale (Cantyre) . . .	”	91	55 34 21	5 29 21	21 21·5	21 22·2	− 0·7	234
235		L. Tosgach	”	91	57 22 27	5 48 32	22 29·4	22 8·2	+ 21·2	235
236		Toumintoul	W	91	57 16 32	3 26 13	20 31·2	20 37·0	− 5·8	236
237		Troon	”	91	55 32 50	4 37 53	21 0·1	20 51·0	+ 9·1	237
238		Uig	T	92	57 35 0	6 21 38	24 41·8	22 33·8	+ 128·0	238
239		Ullapool	W	91	57 54 18	5 9 45	22 5·0	21 54·3	+ 10·7	239
240		Watcarrick (Eskdalemuir) .	G	92	55 15 0	3 10 42	20 3·0	19 56·0	+ 7·0	240
241		Whitburn	W	91	55 52 0	3 40 20	20 41·3	20 22·4	+ 18·9	241
242		Whithorn	”	91	54 43 45	4 24 35	20 29·6	20 30·1	− 0·5	242
243*a*	54	Wick (*a*)	R	85	58 26 20	3 5 45	20 36·9	20 44·5	− 7·6	243*a*
243*b*		” (*b*)	G	92	58 26 30	3 5 38	20 38·2	20 44·5	− 6·3	243*b*
244		Wigtown	W	92	54 52 11	4 26 40	20 37·7	20 33·4	+ 4·3	244

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
210	71° 57′·2	71° 27′·9	+ 29′·3	1·5195	1·5701	– ·0506	4·6636	4·6831	– ·0195	210
211	69 45·4	70 58·3	– 72·9	1·7236	1·6021	+ ·1215	4·6738	4·6454	+ ·0284	211
212	71 6·9	70 58·5	+ 8·4	1·5823	1·5992	– ·0169	4·6255	4·6379	– ·0124	212
213	71 51·6	71 59·0	– 7·4	1·5408	1·5327	+ ·0081	4·7031	4·7125	– ·0094	213
214	71 52·6	71 44·6	+ 8·0	1·5394	1·5508	– ·0114	4·7033	4·7011	+ ·0022	214
215	70 48·1	70 48·0	+ 0·1	1·6103	1·6110	– ·0007	4·6247	4·6263	– ·0016	215
216	70 47·9	70 39·2	+ 8·7	1·6047	1·6215	– ·0168	4·6077	4·6183	– ·0106	216
217	70 47·9	70 56·7	– 8·8	1·6131	1·6005	+ ·0126	4·6318	4·6338	– ·0020	217
218*a*	72 5·5	72 3·3	+ 2·2	1·5303	1·5286	+ ·0017	4·7357	4·7200	+ ·0157	218*a*
218*b*	72 4·1	72 3·5	+ 0·6	1·5253	1·5286	– ·0033	4·7136	4·7210	– ·0074	218*b*
219	70 37·3	70 48·1	– 10·8	1·6199	1·6130	+ ·0069	4·6055	4·6324	– ·0269	219
220*a* 220*b*	70 7·5	70 5·3	+ 2·2	1·6540	1·6593	– ·0053	4·5754	4·5808	– ·0054	220*a* 220*b*
221	70 37·7	70 42·6	– 4·9	1·6189	1·6193	– ·0004	4·6043	4·6263	– ·0220	221
222	71 38·8	71 30·1	+ 8·7	1·5515	1·5666	– ·0151	4·6767	4·6825	– ·0058	222
223	72 7·4	72 8·8	– 1·4	1·5248	1·5198	+ ·0050	4·7274	4·7186	+ ·0088	223
224	71 44·8	71 37·4	+ 7·4	1·5446	1·5574	– ·0128	4·6833	4·6877	– ·0044	224
225	71 43·5	71 40·7	+ 2·8	1·5385	1·5545	– ·0160	4·6589	4·6944	– ·0355	225
226	72 6·7	71 51·0	+ 15·7	1·5083	1·5427	– ·0344	4·6730	4·7064	– ·0334	226
227	70 41·1	70 40·0	+ 1·1	1·6158	1·6223	– ·0065	4·6102	4·6239	– ·0137	227
228	71 54·1	71 56·1	– 2·0	1·5386	1·5379	+ ·0007	4·7078	4·7150	– ·0072	228
229	70 45·9	70 46·7	– 0·8	1·6072	1·6144	– ·0072	4·6062	4·6303	– ·0241	229
230	71 28·5	71 22·9	+ 5·6	1·5692	1·5740	– ·0048	4·6831	4·6721	+ ·0110	230
231	70 8·6	70 8·4	+ 0·2	1·6558	1·6544	+ ·0014	4·5849	4·5803	+ ·0046	231
232*a*	71 56·6	71 58·4	– 1·8	1·5317	1·5320	– ·0003	4·6983	4·7071	– ·0088	232*a*
232*b*	71 56·2	71 58·4	– 2·2	1·5311	1·5320	– ·0009	4·6946	4·7071	– ·0125	232*b*
233	71 42·9	71 36·1	+ 6·8	1·5457	1·5602	– ·0145	4·6779	4·6905	– ·0126	233
234	70 32·8	70 31·4	+ 1·4	1·6254	1·6330	– ·0076	4·6019	4·6174	– ·0155	234
235	71 35·9	71 32·4	+ 3·5	1·5562	1·5643	– ·0081	4·6777	4·6861	– ·0084	235
236	71 9·9	71 14·6	– 4·7	1·5871	1·5820	+ ·0051	4·6529	4·6586	– ·0057	236
237	70 5·9	70 24·5	– 18·6	1·6663	1·6383	+ ·0280	4·6027	4·6030	– ·0003	237
238	72 8·2	71 42·7	+ 25·5	1·5142	2·5528	– ·0386	4·6982	4·6985	– ·0003	238
239	71 56·0	71 46·4	+ 9·6	1·5392	1·5483	– ·0091	4·7186	4·7019	+ ·0167	239
240	70 2·8	70 5·0	– 2·2	1·6590	1·6572	+ ·0018	4·5696	4·5737	– ·0041	240
241	70 21·2	70 29·1	– 7·9	1·6501	1·6323	+ ·0178	4·6221	4·6056	+ ·0165	241
242	69 50·4	69 55·1	– 4·7	1·6749	1·6693	+ ·0056	4·5622	4·5660	– ·0038	242
243*a*	72 5·4	71 50·8	+ 14·6	1·5242	1·5404	– ·0162	4·7162	4·6980	+ ·0182	243*a*
243*b*	72 2·0	71 50·8	+ 11·2	1·5266	1·5404	– ·0138	4·7077	4·6980	+ ·0097	243*b*
244	69 59·4	70 0·2	– 0·8	1·6638	1·6641	– ·0003	4·5688	4·5729	– ·0041	244

Table XXIV.—Summary of Declinations, Inclinations, Horizontal, and

England

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
245		Abergavenny	B	90	51 49 13	3 0 38	18 50·3	18 52·0	− 1·7	245
246		Abergwynolwyn	G	91	52 38 45	3 58 45	19 29·6	19 37·8	− 8·2	246
247	55	Aberystwith	R	86	52 23 51	4 5 13	19 21·5	19 35·8	− 14·3	247
248		Abingdon	B	90	51 39 58	1 16 47	17 51·4	17 58·7	− 7·3	248
249		Alcester	R	92	52 12 39	1 51 54	18 6·8	18 25·3	− 18·5	249
250		Aldeburgh	G	90	52 9 37	1 36 18E.	16 44·8	16 40·8	+ 4·0	250
251	56	Alderney	T	88	49 43 10	2 11 0	17 30·7	..	..	251
252		Alfreton	G	92	53 5 58	1 23 22	18 18·7	18 25·2	− 6·5	252
253	57	Alnwick	R	86	55 25 19	1 43 53	19 10·4	19 8·2	+ 2·2	253
254	58	Alresford	,,	88	51 4 46	1 9 56	17 37·8	17 45·5	− 7·7	254
255*a*		Alston (*a*)	W	91	54 48 40	2 26 30	19 22·2	19 24·6	− 2·4	255*a*
255*b*		,, (*b*)	,,	91	54 48 38	2 26 30	19 23·5	19 24·6	− 1·1	255*b*
256		Ambleside	R & T	90	54 25 18	2 57 38	19 40·1	19 36·3	+ 3·8	256
257		Amlwch	G	91	53 24 50	4 21 4	19 59·1	20 4·1	− 5·0	257
258	59	Appleby	R	86	54 34 10	2 29 3	19 31·0	19 22·5	+ 8·5	258
259		Appledore	B	90	51 1 52	0 47 32E.	16 45·3	16 50·1	− 4·8	259
260		Armathwaite	G	92	54 48 10	2 46 25	19 33·6	19 35·4	− 1·8	260
261		Ashbourne	R & T	90	53 0 53	1 44 5	18 19·9	18 34·7	− 14·8	261
262		Atherstone	,,	90	52 34 54	1 32 37	18 59·7	18 21·2	+ 38·5	262
263		Axbridge	G	90	51 16 46	2 48 52	18 38·7	18 35·7	+ 3·0	263
264		Aysgarth	R & R	89	54 17 21	1 58 58	19 6·7	19 1·8	+ 4·9	264
265		Bakewell	G	92	53 12 46	1 40 4	18 9·5	18 35·9	− 26·4	265
266		Bala	,,	91	52 52 15	3 39 22	19 52·1	19 32·1	+ 20·0	266
267		Barmouth (1)	,,	91	52 45 0	3 58 30	18 40·7	19 39·5	− 58·8	267
268		,, (2)	,,	91	52 43 35	4 2 12	19 31·9	19 41·2	− 9·3	268
269		Barnard Castle	R & R	89	54 32 32	1 55 29	18 59·4	19 3·3	− 3·9	269
270		Barnsley	G	90	53 31 53	1 33 40	18 40·0	18 36·5	+ 3·5	270
271	60	Barrow	R	86	54 7 24	3 13 0	19 34·2	19 40·3	− 6·1	271
272		Barton Hill	,,	89	54 4 22	0 54 50	18 40·2	18 23·7	+ 16·5	272
273		Barton-on-Humber	W	91	53 40 25	0 31 35	18 24·5	18 6·8	+ 17·7	273
274		Basingstoke	G	90	51 13 59	1 3 53	17 35·4	17 44·9	− 9·5	274
275		Beaumaris	B	90	53 14 48	4 5 14	20 9·5	19 53·1	+ 16·4	275
276		Beccles	G	92	52 27 23	1 33 32E.	16 49·8	16 45·2	+ 4·6	276
277	61	Bedford	T	88	52 8 3	0 26 51	17 55·7	17 41·8	+ 13·9	277
278		Bellingham	G	92	55 8 40	2 15 25	19 20·2	19 22·8	− 2·6	278
279		Bettws-y-Coed	,,	91	53 6 22	3 47 30	20 9·0	19 40·9	+ 28·1	279
280		Beverley	R	89	53 50 30	0 27 19	18 32·5	18 5·8	+ 26·7	280
281		Bewdley, East	B	90	52 22 19	2 18 33	18 42·4	18 41·3	+ 1·1	281
282		,, West	,,	90	52 22 15	2 19 10	18 44·7	18 41·6	+ 3·1	282
283		Bideford	G	90	51 0 39	4 13 15	19 16·6	19 10·3	+ 6·3	283
284		Bingham	,,	90	52 57 35	0 57 30	18 4·9	18 9·7	− 4·8	284
285	62	Birkenhead	R	86	53 24 4	3 4 18	19 23·6	19 23·5	+ 0·1	285
286	63	Birmingham	,,	86	52 27 37	1 53 40	18 10·8	18 30·6	− 19·8	286
287		Bishop Auckland	G	92	54 39 48	1 39 53	18 52·0	18 55·8	− 3·8	287
288		Bishop's Castle	W	92	52 29 37	2 59 33	19 7·4	19 4·2	+ 3·2	288
289		Bitterley (Ludlow)	B	90	52 23 26	2 38 7	19 0·8	18 52·1	+ 8·7	289
290		Blakeney	W	92	51 45 40	2 27 5	18 26·2	18 34·4	− 8·2	290
291		Blandford	G	90	50 51 15	2 10 9	18 8·1	18 9·6	− 1·5	291
292		Bootle	W	92	54 17 22	3 23 47	19 43·6	19 48·7	− 5·1	292
293		Boroughbridge	R & R	89	54 3 58	1 24 33	18 47·5	18 39·8	+ 7·7	293
294		Boston	R	89	52 58 37	0 1 7	17 58·5	17 40·9	+ 17·6	294
295		Boulmer (1)	W	91	55 25 18	1 35 0	..	..	..	295
296		,, (2)	,,	91	55 25 15	1 35 0	18 59·9	19 3·2	− 3·3	296
297		,, (3)	,,	91	55 25 18	1 35 0	18 58·9	19 3·2	− 4·3	297
298		,, (4)	,,	91	55 25 17	1 35 0	18 58·7	19 3·2	− 4·5	298
299		Bourne	G	92	52 46 10	0 22 30	17 42·9	17 49·1	− 6·2	299
300		Bourton-on-the Water	B	90	51 52 32	1 44 55	17 49·0	18 16·0	− 27·0	300
301		Bovey Tracey	G	90	50 35 33	3 41 12	18 34·0	18 46·6	− 12·6	301
302	64	Braintree	T	88	51 52 41	0 32 40E.	17 24·5	17 8·5	+ 16·0	302
303	65	Brecon	R	86	51 56 56	3 24 42	19 4·4	19 6·4	− 2·0	303

Vertical Forces, Observed and Calculated, with Differences (continued).

and Wales.

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
245	67° 56′·8	68° 0′·0	− 3′·2	1·7930	1·7905	+ ·0025	4·4260	4·4316	− ·0056	245
246	68 27·1	68 38·1	− 11·0	1·7598	1·7507	+ ·0091	4·4565	4·4751	− ·0186	246
247	68 28·1	68 29·6	− 1·5	1·7594	1·7604	− ·0010	4·4593	4·4674	− ·0081	247
248	67 49·6	67 41·3	+ 8·3	1·8028	1·8079	− ·0051	4·4235	4·4055	+ ·0180	248
249	68 5·9	68 6·7	− 0·8	1·7753	1·7810	− ·0057	4·4158	4·4329	− ·0171	249
250	67 39·0	67 39·5	− 0·5	1·8052	1·8046	+ ·0006	4·3907	4·3910	− ·0603	250
251	66 31·8	..	..	1·8804	..	..	..	..	..	251
252	68 41·1	68 36·7	+ 4·4	1·7450	1·7471	− ·0021	4·4723	4·4608	+ ·0115	252
253	69 58·3	70 1·8	− 3·5	1·6608	1·6592	+ ·0016	4·5561	4·5660	− ·0099	253
254	67 15·8	67 17·7	− 1·9	1·8344	1·8341	+ ·0003	4·3773	4·3835	− ·0062	254
255*a*	69 35·8	69 45·1	− 9·3	1·6807	1·6773	+ ·0034	4·5185	4·5469	− ·0284	255*a*
255*b*	69 37·5	69 45·1	− 7·6	1·6839	1·6773	+ ·0066	4·5339	4·5469	− ·0130	255*b*
256	69 38·0	69 34·7	+ 3·3	1·6825	1·6883	− ·0058	4·5322	4·5341	− ·0019	256
257	69 17·4	69 8·3	+ 9·1	1·7029	1·7088	− ·0059	4·5042	4·4839	+ ·0203	257
258	69 39·3	69 37·2	+ 2·1	1·6790	1·6855	− ·0065	4·5280	4·5370	− ·0090	258
259	66 58·9	67 0·6	− 1·7	1·8518	1·8497	+ ·0021	4·3587	4·3597	− ·0010	259
260	69 40·5	69 46·7	− 6·2	1·6846	1·6756	+ ·0090	4·5480	4·5488	− ·0008	260
261	68 30·8	68 35·8	− 5·0	1·7525	1·7488	+ ·0037	4·4521	4·4617	− ·0096	261
262	68 23·0	68 18·3	+ 4·7	1·7620	1·7674	− ·0054	4·4465	4·4423	+ ·0042	262
263	67 36·6	67 37·6	− 1·0	1·8175	1·8147	+ ·0028	4·4117	4·4086	+ ·0031	263
264	69 29·5	69 23·8	+ 5·7	1·6885	1·6984	− ·0099	4·5141	4·5177	− ·0036	264
265	68 39·2	68 42·7	− 3·5	1·7512	1·7414	+ ·0098	4·4808	4·4692	+ ·0116	265
266	68 38·8	68 44·0	− 5·2	1·7496	1·7437	+ ·0059	4·4752	4·4800	− ·0048	266
267	68 25·3	68 41·7	− 16·4	1·7752	1·7468	+ ·0284	4·4886	4·4791	+ ·0095	267
268	68 30·0	68 41·5	− 11·5	1·7725	1·7472	+ ·0253	4·4998	4·4793	+ ·0205	268
269	69 36·5	69 32·2	+ 4·3	1·6796	1·6895	− ·0099	4·5184	4·5276	− ·0092	269
270	68 54·8	68 53·7	+ 1·1	1·7298	1·7293	+ ·0005	4·4860	4·4804	+ ·0056	270
271	69 24·7	69 26·2	− 1·5	1·6977	1·6989	− ·0012	4·5195	4·5287	− ·0092	271
272	69 11·8	69 9·0	+ 2·8	1·7076	1·7117	− ·0041	4·4945	4·4943	+ ·0002	272
273	68 56·5	68 51·7	+ 4·8	1·7289	1·7297	− ·0008	4·4902	4·4737	+ ·0165	273
274	67 17·3	67 22·7	− 5·4	1·8383	1·8280	+ ·0103	4·3922	4·3868	+ ·0054	274
275	69 10·8	69 0·8	+ 10·0	1·7174	1·7264	− ·0090	4·5163	4·5005	+ ·0158	275
276	67 54·3	67 51·4	+ 2·9	1·7857	1·7913	− ·0056	4·3988	4·4019	− ·0031	276
277	68 1·2	67 53·7	+ 7·5	1·7802	1·7928	− ·0126	4·4105	4·4140	− ·0035	277
278	69 49·5	69 55·3	− 5·8	1·6702	1·6662	+ ·0040	4·5456	4·5585	− ·0129	278
279	69 3·9	68 53·7	+ 10·2	1·7231	1·7335	− ·0104	4·5040	4·4912	+ ·0128	279
280	68 58·7	68 57·3	+ 1·4	1·7216	1·7233	− ·0017	4·4799	4·4789	+ ·0010	280
281	68 13·2	68 15·7	− 2·5	1·7717	1·7718	− ·0001	4·4340	4·4437	− ·0097	281
282	68 13·8	68 15·8	− 2·0	1·7722	1·7718	+ ·0004	4·4375	4·4441	− ·0066	282
283	67 41·1	67 37·6	+ 3·5	1·8091	1·8172	− ·0081	4·4078	4·4148	− ·0070	283
284	68 32·3	68 28·6	+ 3·7	1·7559	1·7553	+ ·0006	4·4663	4·4507	+ ·0156	284
285	68 58·2	68 59·3	− 1·1	1·7278	1·7259	+ ·0019	4·4941	4·4934	+ ·0007	285
286	68 15·2	68 16·7	− 1·5	1·7770	1·7707	+ ·0063	4·4548	4·4448	+ ·0100	286
287	69 38·5	69 34·6	+ 3·9	1·6749	1·6866	− ·0117	4·5138	4·5294	− ·0156	287
288	68 30·0	68 25·1	+ 4·9	1·7557	1·7629	− ·0072	4·4571	4·4568	+ ·0003	288
289	68 16·6	68 18·9	− 2·3	1·7706	1·7693	+ ·0013	4·4441	4·4494	− ·0053	289
290	67 57·4	67 54·1	+ 3·3	1·7907	1·7963	− ·0056	4·4224	4·4242	− ·0018	290
291	67 12·3	67 15·7	− 3·4	1·8381	1·8374	+ ·0007	4·3737	4·3841	− ·0104	291
292	69 35·1	69 33·2	+ 1·9	1·6870	1·6908	− ·0038	4·5326	4·5351	− ·0025	292
293	69 18·3	69 12·0	+ 6·3	1·7067	1·7094	− ·0027	4·5178	4·5000	+ ·0178	293
294	68 19·1	68 22·6	− 3·5	1·7696	1·7598	+ ·0098	4·4510	4·4395	+ ·0115	294
295	69 56·8	70 0·4	− 3·6	1·6608	1·6598	+ ·0010	4·5499	4·5619	− ·0120	295
296	70 0·5	70 0·4	+ 0·1	1·6581	1·6598	− ·0017	4·5576	4·5619	− ·0043	296
297	69 57·9	70 0·4	− 2·5	1·6619	1·6598	+ ·0021	4·5573	4·5619	− ·0046	297
298	69 58·0	70 0·4	− 2·4	1·6595	1·6598	− ·0003	4·5512	4·5619	− ·0107	298
299	68 15·3	68 17·2	− 1·9	1·7681	1·7665	+ ·0016	4·4329	4·4360	− ·0031	299
300	68 1·5	67 53·0	+ 8·5	1·7845	1·7956	− ·0111	4·4223	4·4183	+ ·0040	300
301	67 6·7	67 16·8	− 10·1	1·8498	1·8385	+ ·0113	4·3816	4·3908	− ·0092	301
302	67 39·4	67 36·4	+ 3·0	1·8038	1·8100	− ·0062	4·3886	4·3928	− ·0042	302
303	68 9·2	68 8·0	+ 1·2	1·7806	1·7827	− ·0021	4·4413	4·4421	− ·0008	303

Table XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
304		Brent Tor, (1)	G	90	50 36 5	4 9 55	19 7·4	19 0·4	+ 7·0	304
305		,, (2)	,,	90	50 36 5	4 9 10	19 0·6	18 59·8	+ 0·8	305
306		Bridgend	B	90	51 29 46	3 34 2	18 55·8	19 2·3	− 6·5	306
307		Brigg	R	89	53 33 13	0 29 1	18 18·0	18 4·3	+ 13·7	307
308		Brightlingsea	G	90	51 48 53	1 1 43E.	16 57·2	16 54·2	+ 3·0	308
309		Bromsgrove	B	90	52 19 37	2 3 5	18 8·3	18 32·7	− 24·4	309
310		Bromyard	,,	90	52 12 8	2 28 50	18 43·9	18 43·2	+ 0·7	310
311*a*	66*a*	Bude Haven, (*a*)	T	87	50 49 34	4 32 37	19 21·8	19 15·0	+ 6·8	311*a*
311*b*	66*b*	,, (*b*)	,,	87	50 49 42	4 32 54				311*b*
312		Buildwas	B	90	52 38 13	2 31 0	18 57·7	18 52·3	+ 5·4	312
313		Builth	G	91	52 9 34	3 24 40	19 17·3	19 10·5	+ 6·8	313
314		Burnley	W	91	53 46 3	2 15 28	18 49·7	19 3·4	− 13·7	314
315		Burrough-on-the-Hill	G	90	52 41 25	0 52 28	18 19·0	13 2·8	+ 16·2	315
316		Burton-on-Trent	R & T	90	52 48 53	1 38 53	18 25·9	18 28·7	− 2·8	316
317		Bury St. Edmunds	G	90	52 13 35	0 42 43E.	17 10·0	17 8·2	+ 1·8	317
318		Butterwick-on-Trent	R	89	53 32 23	0 44 4	18 10·1	18 10·4	− 0·3	318
319		Buxton	R & T	90	53 15 24	1 56 15	18 37·3	18 45·0	− 7·7	319
320		Carmarthen	B	90	51 51 33	4 18 10	19 34·4	19 30·9	+ 3·5	320
321		Caerphilly	W	92	51 34 3	3 13 6	18 53·1	18 53·4	− 0·3	321
322	67	Cambridge	T	86	52 11 40 52 11 23	0 7 17E. 0 7 16E.	17 33·6	17 25·4	+ 8·2	322
323*a*	68	Cardiff (*a*)	R	86	51 29 36	3 10 33	18 45·9	18 50·3	− 4·4	323*a*
323*b*		,, (*b*)	W	92	51 29 36	3 10 33	18 45·0	18 50·3	− 5·3	323*b*
324	69	Cardigan	R	86	52 5 20	4 40 9	19 50·4	19 46·7	+ 3·7	324
325	70	Carlisle	,,	86	54 53 55	2 55 40	19 50·5	19 42·5	+ 8·0	325
326		Carnarvon	G	91	53 7 29	4 16 5	19 46·8	19 56·3	− 9·5	326
327		Carno	W	92	52 33 41	3 32 20	19 24·3	19 22·1	+ 2·2	327
328		Castle Cary	G	90	51 5 19	2 30 5	18 19·9	18 23·2	− 3·3	328
329		Castleton	,,	92	53 20 37	1 46 33	18 33·2	18 41·4	− 8·2	329
330		Chelmsford	,,	90	51 41 27	0 27 53E.	17 20·9	17 8·2	+ 12·7	330
331*a*	201	Chepstow (*a*)	T	89	..	..	..	..	..	331*a*
331*b*		,, (*b*)	W	92	51 38 2	2 41 7	18 39·9	18 38·7	+ 1·2	331*b*
332		Chester	B	90	53 11 7	2 53 46	19 11·6	19 14·2	− 2·6	332
333	71	Chesterfield	R	87	53 14 3	1 24 37	18 38·8	18 28·2	+ 10·6	333
334	72	Chichester	T	88	50 50 0	0 47 2	17 34·0	17 30·6	+ 3·4	334
335		Chilcompton	G	90	51 15 45	2 29 38	18 27·3	18 26·1	+ 1·2	335
336		Chippenham	,,	90	51 26 55	2 5 55	18 4·8	18 18·5	− 13·7	336
337		Cirencester	W	92	51 42 32	1 58 58	18 6·9	18 19·7	− 12·8	337
338	73	Clenchwarton	R	88	52 45 20	0 21 20E.	17 38·9	17 26·3	+ 12·6	338
339	74	Clifton	T	86	51 27 15	2 37 4	18 37·5	18 33·5	+ 4·0	339
340	75	Clovelly	,,	87	50 59 48	4 23 50	19 19·3	19 14·8	+ 4·5	340
341		Clun	W	92	52 24 37	3 2 23	19 13·4	19 4·1	+ 9·3	341
342		Coalport	,,	92	52 37 6	2 26 0	18 45·7	18 48·0	− 2·3	342
343	76	Coalville	T	88	52 43 41	1 21 18	18 8·7	18 18·9	− 10·2	343
344		Cockermouth	W	91	54 40 16	3 20 53	19 54·0	19 53·3	+ 0·7	344
345	77	Colchester	T	88	51 53 30	0 54 0E.	17 24·7	16 58·5	+ 26·2	345
346		Coleshill	R & T	90	52 29 53	1 42 32	18 18·4	18 25·6	− 7·2	346
347		Congleton	G	92	53 10 5	2 13 0	18 40·0	18 52·5	− 12·5	347
348		Coniston	W	92	54 22 9	3 3 52	19 35·0	19 38·8	− 3·8	348
349		Corby (Lincoln)	G	92	52 48 35	0 31 40	17 58·6	17 54·0	+ 4·6	349
350		Corfe Castle	,,	90	50 38 14	2 3 35	17 57·6	18 2·9	− 5·3	350
351		Corley Ash	R & T	90	52 28 20	1 33 52	18 4·6	18 20·8	− 16·2	351
352		Craven Arms	W	92	52 26 15	2 50 18	19 8·0	18 58·8	+ 9·2	352
353		Crickhowel	,,	92	51 51 52	3 9 9	18 45·0	18 57·0	− 12·0	353
354	78	Cromer	T	86	52 55 20	1 18 24E.	17 5·1	16 58·8	+ 6·3	354
355		Crosby (Isle of Man)	W	92	54 11 7	4 34 24	19 59·9	20 26·0	− 26·1	355
356		Crynant	,,	92	51 43 47	3 44 32	19 15·8	19 11·5	+ 4·3	356
357		Cuckfield	B	90	51 0 10	0 8 20	17 45·2	17 15·5	+ 29·7	357

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
304	67° 12′·4	67° 20′·9	− 8′·5	1·8482	1·8350	+ ·0132	4·3981	4·3971	+ ·0010	304
305	..	..	..	1·8390	1·8351	+ ·0039	..	..	..	305
306	67 47·4	67 51·6	− 4·2	1·8039	1·8003	+ ·0036	4·4180	4·4248	− ·0068	306
307	68 51·8	68 47·0	+ 4·8	1·7341	1·7346	− ·0005	4·4854	4·4682	+ ·0172	307
308	67 30·9	67 29·9	+ 1·0	1·8143	1·8163	− ·0020	4·3833	4·3846	− ·0013	308
309	68 11·1	68 12·6	− 1·5	1·7775	1·7751	+ ·0024	4·4407	4·4403	+ ·0004	309
310	68 10·8	68 10·6	+ 0·2	1·7743	1·7778	− ·0035	4·4316	4·4396	− ·0080	310
311*a* 311*b*	67 37·0	67 32·6	+ 4·4	1·8193	1·8231	− ·0038	4·4175	4·4108	+ ·0067	311*a* 311*b*
312	68 24·5	68 27·5	− 3·0	1·7609	1·7598	+ ·0011	4·4493	4·4580	− ·0087	312
313	68 19·1	68 15·9	+ 3·2	1·7682	1·7741	− ·0059	4·4474	4·4502	− ·0028	313
314	69 13·5	69 7·0	+ 6·5	1·7106	1·7162	− ·0056	4·5091	4·4981	+ ·0110	314
315	68 13·7	68 17·7	− 4·0	1·7759	1·7669	+ ·0090	4·4464	4·4388	+ ·0076	315
316	68 27·6	68 27·8	− 0·2	1·7585	1·7574	+ ·0011	4·4551	4·4531	+ ·0020	316
317	67 48·3	67 48·7	− 0·4	1·7973	1·7960	+ ·0013	4·4052	4·4035	+ ·0017	317
318	68 50·6	68 48·4	+ 2·2	1·7389	1·7336	+ ·0053	4·4931	4·4711	+ ·0220	318
319	68 44·9	68 46·3	− 1·4	1·7426	1·7379	+ ·0047	4·4807	4·4739	+ ·0068	319
320	68 17·8	68 10·9	+ 6·9	1·7692	1·7811	− ·0119	4·4451	4·4489	− ·0038	320
321	67 53·1	67 51·8	+ 1·3	1·7982	1·7997	− ·0015	4·4252	4·4241	+ ·0011	321
322	67 56·4	67 51·7	+ 4·7	1·7881	1·7939	− ·0058	4·4123	4·4094	+ ·0029	322
323*a*	67 45·6	67 48·4	− 2·8	1·8051	1·8034	+ ·0017	4·4145	4·4207	− ·0062	323*a*
323*b*	67 46·1	67 48·4	− 2·3	1·8056	1·8034	+ ·0022	4·4175	4·4207	− ·0032	323*b*
324	68 24·5	68 22·2	+ 2·3	1·7643	1·7698	− ·0055	4·4579	4·4631	− ·0052	324
325	69 48·4	69 51·4	− 3·0	1·6725	1·6710	+ ·0015	4·5475	4·5557	− ·0082	325
326	69 7·4	68 57·3	+ 10·1	1·7238	1·7303	− ·0065	4·5197	4·4970	+ ·0227	326
327	68 37·2	68 31·7	+ 5·5	1·7493	1·7569	− ·0076	4·4682	4·4666	+ ·0016	327
328	67 25·2	67 27·8	− 2·6	1·8277	1·8247	+ ·0030	4·3951	4·3973	− ·0022	328
329	68 48·7	68 48·1	+ 0·6	1·7377	1·7356	+ ·0021	4·4827	4·4751	+ ·0076	329
330	67 33·9	67 29·5	+ 4·4	1·8139	1·8179	− ·0040	4·3933	4·3870	+ ·0063	330
331*a*	67 51·0	67 50·2	+ 0·8	..	..	..	..	..	..	331*a*
331*b*	67 50·6	67 50·2	+ 0·4	1·8008	1·8004	+ ·0004	4·4224	4·4198	+ ·0026	331*b*
332	68 47·2	68 50·4	− 3·2	1·7383	1·7356	+ ·0027	4·4785	4·4839	− ·0054	332
333	68 42·6	68 42·0	+ 0·6	1·7449	1·7426	+ ·0023	4·4771	4·4695	+ ·0076	333
334	67 5·1	67 4·8	+ 0·3	1·8499	1·8476	+ ·0023	4·3763	4·3697	+ ·0066	334
335	67 33·7	67 34·4	− 0·7	1·8176	1·8175	+ ·0001	4·4014	4·4037	− ·0023	335
336	67 38·0	67 39·0	− 1·0	1·8135	1·8119	+ ·0016	4·4072	4·4069	+ ·0003	336
337	67 54·5	67 48·2	+ 6·3	1·7907	1·8015	− ·0108	4·4117	4·4151	− ·0034	337
338	68 12·1	68 11·6	+ 0·5	1·7756	1·7715	+ ·0041	4·4398	4·4275	+ ·0123	338
339	67 42·1	67 43·3	− 1·2	1·8101	1·8083	+ ·0018	4·4139	4·4139	·0000	339
340	67 42·8	67 38·5	+ 4·3	1·8112	1·8166	− ·0054	4·4192	4·4165	+ ·0027	340
341	68 24·8	68 22·5	+ 2·3	1·7638	1·7659	− ·0021	4·4579	4·4545	+ ·0034	341
342	68 25·5	68 22·2	+ 3·3	1·7582	1·7649	− ·0067	4·4463	4·4508	− ·0045	342
343	68 18·1	68 22·7	− 4·6	1·7632	1·7626	+ ·0006	4·4311	4·4468	− ·0157	343
344	69 43·0	69 45·9	− 2·9	1·6809	1·6771	+ ·0038	4·5481	4·5497	− ·0016	344
345	67 29·4	67 34·4	− 5·0	1·8107	1·8116	− ·0009	4·3693	4·3894	− ·0201	345
346	68 20·6	68 16·5	+ 4·1	1·7657	1·7701	− ·0044	4·4468	4·4424	+ ·0044	346
347	68 41·6	68 45·0	− 3·4	1·7427	1·7400	+ ·0027	4·4682	4·4745	− ·0063	347
348	69 40·4	69 33·7	+ 6·7	1·6823	1·6896	− ·0073	4·5413	4·5338	+ ·0075	348
349	68 16·7	68 19·9	− 3·2	1·7691	1·7639	+ ·0052	4·4407	4·4396	+ ·0011	349
350	67 4·0	67 6·5	− 2·5	1·8472	1·8471	+ ·0001	4·3659	4·3745	− ·0086	350
351	68 17·7	68 14·3	+ 3·4	1·7724	1·7723	+ ·0001	4·4527	4·4397	+ ·0130	351
352	68 20·7	68 22·2	− 1·5	1·7707	1·7659	+ ·0048	4·4598	4·4534	+ ·0064	352
353	68 1·8	68 2·6	− 0·8	1·7904	1·7879	+ ·0025	4·4381	4·4349	+ ·0032	353
354	68 14·4	68 11·2	+ 3·2	1·7695	1·7703	− ·0008	4·4330	4·4230	+ ·0100	354
355	69 47·1	69 37·4	+ 9·7	1·6748	1·6882	− ·0134	4·5483	4·5451	+ ·0032	355
356	68 2·5	68 1·8	+ 0·7	1·7931	1·7901	+ ·0030	4·4473	4·4374	+ ·0099	356
357	67 13·8	67 6·6	+ 7·2	1·8455	1·8444	+ ·0011	4·3966	4·3685	+ ·0281	357

Table XXIV.—Summary of Declinations, Inclinations, Horizontal, and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
358		Dartford	W	91	51 26 15	0 13 5E.	17 14·4	17 12·1	+ 2·3	358
359		Dartmouth	G	90	50 21 8	3 35 20	18 42·2	18 39·6	+ 2·6	359
360		Daventry	R & T	90	52 15 13	1 9 46	18 24·6	18 4·6	+ 20·0	360
361		Dawley (Salop)	B	90	52 39 44	2 28 13	18 50·1	18 51·6	− 1·5	361
362		Deal	,,	90	51 14 18	1 24 7E.	16 16·2	16 35·9	− 19 7	362
363		Derby	G	92	52 55 45	1 27 32	17 59·9	18 25·0	− 25·1	363
364		Dereham	,,	90	52 41 25	0 56 35E.	17 13·7	17 7·3	+ 6·4	364
365		Desford	,,	92	52 37 54	1 16 52	17 59·7	18 14·6	− 14·9	365
366		Devynock	W	92	51 57 1	3 34 20	19 14·3	19 11·0	+ 3·3	366
367		Dhoon Glen (Isle of Man)	,,	92	54 15 9	4 22 30	20 12·7	20 20·2	− 7·5	367
368		Dinas Mawddwy	B	90	52 43 22	3 42 20	19 34·5	20 1·3	− 26·8	368
369		Diss	G	92	52 22 28	1 6 27E.	16 57·3	16 58·2	− 0·9	369
370		Dolygaer (Merthyr Tydvil)	B	90	51 49 34	3 21 18	19 5·5	19 2·5	+ 3·0	370
371		Doncaster	R	89	53 31 12	1 5 49	18 19·2	18 22·2	− 3·0	371
372		Dorrington	W	92	52 37 30	2 46 0	18 59·2	18 59·7	− 0·5	372
373	79	Dover	T	87	51 6 53	1 17 52E.	16 27·4	16 37·3	− 9·9	373
374		Downham Market	G	90	52 36 12	0 23 25E.	17 20·1	17 22·8	− 2·7	374
375		Drewsteignton	,,	90	50 42 13	3 48 40	19 15·5	18 52·3	+ 23·2	375
376		Dunchurch	R & T	90	52 20 22	1 17 10	18 34·0	18 9·9	+ 24·1	376
377		Durham	W	91	54 46 3	1 34 58	18 45·4	18 54·5	− 9·1	377
378		Eastbourne	B	90	50 45 50	0 15 52E.	17 4·1	17 1·0	+ 3·1	378
379		East Grinstead	,,	90	51 7 0	0 0 20	17 18·9	17 13·5	+ 5·4	379
380		Eggesford	G	90	50 53 40	3 52 13	19 5·5	18 57·9	+ 7·6	380
381		Ely	,,	90	52 25 13	0 16 38E.	17 27·7	17 24·1	+ 3·6	381
382		Eskdale (1)	W	91	54 23 51	3 15 58	19 45·0	19 45·8	− 0·8	382
383		,, (2)	,,	91	54 23 51	3 15 22	19 41·8	19 45·8	− 4·0	383
384		Etchingham	B	90	51 0 23	0 26 9E.	16 58·6	16 59·6	− 1·0	384
385		Exhall	R	92	52 27 55	1 28 45	18 48·5	18 17·5	+ 31·0	385
386	80	Falmouth	T	87	50 8 47	5 4 21	19 18·7	19 15·1	+ 3·6	386
387		Faringdon	W	92	51 39 40	1 34 23	17 47·5	18 6·7	− 19·2	387
388		Fenny Compton	R	92	52 10 25	1 22 15	18 19·8	18 9·5	+ 10·3	388
389		Ferryside	B	90	51 45 21	4 21 35	19 14·6	19 30·7	− 16·1	389
390		Fleetwood	W	91	53 55 10	3 1 51	19 20·8	19 30·8	− 10·0	390
391		Foggathorpe	R	89	53 49 44	0 51 7	..	..	..	391
392		Ford Junction	G	90	50 49 30	0 34 33	17 30·8	17 24·9	+ 5·9	392
393		Forncett	,,	90	52 29 43	1 12 48E.	17 1·4	16 56·7	+ 4·7	393
394		Freshwater	,,	90	50 40 0	1 32 23	..	..	..	394
395	81	Gainsborough	R	87	53 23 23	0 44 51	18 3·7	18 9·5	− 5·8	395
396		,,	G	92	53 22 45	0 45 45	18 3·9	18 9·5	− 5·6	396
397		Garstang	W	91	53 53 45	2 46 38	19 17·2	19 22·2	− 5·0	397
398	82	Giggleswick	R	86	54 4 18	2 17 48	19 1·0	19 9·1	− 8·1	398
399	83	Gloucester	,,	86	51 52 12	2 14 50	18 39·8	18 30·6	+ 9·2	399
400	202	Goodrich	T	89	51 52 0	2 37 0	..	..	..	400
401		Gospel Oak	R & T	90	52 32 29	1 36 49	18 21·5	18 22·8	− 1·3	401
402	84	Grantham	T	86	52 54 54	0 37 46	17 56·6	17 58·9	− 2·3	402
403		Gravesend	W	91	51 26 0	0 23 25E.	17 13·0	17 6·3	+ 6·7	403
404		Great Dalby	G	90	52 42 58	0 53 43	18 30·1	18 4·1	+ 26·0	404
405		Great Driffield	R	89	54 0 12	0 26 25	18 31·1	18 7·4	+ 23·7	405
406		Great Grimsby	,,	89	53 33 15	0 5 31	17 58·3	17 51·5	+ 6·8	406
407	G	Greenwich*	..	91	51 28 38	0 0 0	17 26·0	..	..	407
408		Grosmont	G	92	54 26 45	0 44 36	18 24·3	18 22·5	+ 1·8	408
409	85	Guernsey (L'Erée)	T	88	49 27 50	2 35 40	18 0·4	..	..	409
410	86	,, (Peter Port)	,,	88	49 27 45	2 31 45	17 46·1	..	..	410
411		Guildford	G	90	51 14 12	0 32 53	17 31·6	17 30·8	+ 0·8	411
412		Guisboro'	,,	92	54 32 16	1 2 50	18 31·6	18 33·9	− 2·3	412

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* Note.—The observed values are the means of the two years 1890–91. The calculated values are not given, as the relation between the Greenwich and Survey Instruments has not been determined.

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
358	67° 21′·0	67° 24′·8	− 3′·8	1·8324	1·8276	+ ·0048	4·3913	4·3934	− ·0021	358
359	67 3·4	67 6·4	− 3·0	1·8484	1·8493	− ·0009	4·3666	4·3794	− ·0128	359
360	68 4·2	68 3·1	+ 1·1	1·7766	1·7838	− ·0072	4·4128	4·4266	− ·0138	360
361	68 24·2	68 27·8	− 3·6	1·7608	1·7594	+ ·0014	4·4480	4·4581	− ·0101	361
362	67 8·5	67 4·3	+ 4·2	1·8412	1·8446	− ·0034	4·3676	4·3607	+ ·0069	362
363	68 29·8	68 31·0	− 1·2	1·7554	1·7536	+ ·0018	4·4556	4·4555	+ ·0001	363
364	68 7·4	68 4·8	+ 2·6	1·7810	1·7777	+ ·0033	4·4357	4·4177	+ ·0180	364
365	68 19·2	68 18·3	+ 0·9	1·7638	1·7672	− ·0034	4·4367	4·4419	− ·0052	365
366	68 13·0	68 9·1	+ 3·9	1·7786	1·7817	− ·0031	4·4506	4·4437	+ ·0069	366
367	69 43·8	69 38·2	+ 5·6	1·6782	1·6871	− ·0089	4·5440	4·5454	− ·0014	367
368	68 33·6	68 38·7	− 5·1	1·7528	1·7495	+ ·0033	4·4634	4·4746	− ·0112	368
369	67 51·7	67 51·2	+ 0·5	1·7966	1·7925	+ ·0041	4·4160	4·4041	+ ·0119	369
370	68 1·6	68 2·7	− 1·1	1·7883	1·7880	+ ·0003	4·4321	4·4355	− ·0034	370
371	68 52·8	68 50·1	+ 2·7	1·7342	1·7323	+ ·0019	4·4896	4·4742	+ ·0154	371
372	68 34·5	68 28·6	+ 5·9	1·7488	1·7588	− ·0100	4·4567	4·4596	− ·0029	372
373	67 1·9	67 0·2	+ 1·7	1·8433	1·8491	− ·0058	4·3491	4·3569	− ·0078	373
374	68 4·7	68 5·2	− 0·5	1·7848	1·7780	+ ·0068	4·4350	4·4199	+ ·0151	374
375	67 18·4	67 22·1	− 3·7	1·8579	1·8330	+ ·0249	4·4429	4·3966	+ ·0463	375
376	68 7·9	68 7·4	+ 0·5	1·7813	1·7790	+ ·0023	4·4382	4·4307	+ ·0075	376
377	69 38·4	69 38·0	+ 0·4	1·6815	1·6828	− ·0013	4·5312	4·5329	− ·0017	377
378	66 50·0	66 53·4	− 3·4	1·8577	1·8579	− ·0002	4·3414	4·3536	− ·0122	378
379	67 7·2	67 10·3	− 3·1	1·8430	1·8400	+ ·0030	4·3673	4·3712	− ·0039	379
380	67 32·2	67 30·2	+ 2·0	1·8228	1·8245	− ·0017	4·4086	4·4054	+ ·0032	380
381	67 57·7	67 59·0	− 1·3	1·7869	1·7852	+ ·0017	4·4142	4·4149	− ·0007	381
382	69 36·6	69 36·0	+ 0·6	1·6857	1·6875	− ·0018	4·5351	4·5375	− ·0024	382
383	69 37·3	69 36·0	+ 1·3	1·6870	1·6875	− ·0005	4·5414	4·5375	+ ·0039	383
384	66 59·1	67 2·4	− 3·3	1·8474	1·8482	− ·0008	4·3490	4·3625	− ·0135	384
385	68 22·2	68 13·8	+ 8·4	1·7633	1·7725	− ·0092	4·4168	4·4383	+ ·0085	385
386	67 7·5	67 9·5	− 2·0	1·8441	1·8482	− ·0041	4·3709	4·3878	− ·0169	386
387	67 54·7	67 43·5	+ 11·2	1·7990	1·8058	− ·0068	4·4329	4·4085	+ ·0244	387
388	68 9·6	68 1·6	+ 8·0	1·7792	1·7856	− ·0064	4·4393	4·4254	+ ·0139	388
389	68 21·6	68 7·4	+ 14·2	1·7751	1·7850	− ·0099	4·4742	4·4456	+ ·0286	389
390	69 17·7	69 17·7	0·0	1·7067	1·7064	+ ·0003	4·5155	4·5147	+ ·0008	390
391	69 7·1	68 59·7	+ 7·4	..	..	..	..	..	..	391
392	67 0·2	67 2·7	− 2·5	1·8512	1·8492	+ ·0020	4·3619	4·3659	− ·0040	392
393	67 55·9	67 55·2	+ 0·7	1·7901	1·7879	+ ·0022	4·4154	4·4074	+ ·0080	393
394	67 3·9	67 3·4	+ 0·5	1·8449	1·8494	− ·0045	4·3601	4·3689	− ·0088	394
395	68 43·5	68 42·5	+ 1·0	1·7417	1·7398	+ ·0019	4.4730	4·4643	+ ·0087	395
396	68 41·9	68 42·5	− 0·6	1·7426	1·7398	+ ·0028	4·4691	4·4643	+ ·0048	396
397	69 15·1	69 15·3	− 0·2	1·7087	1·7085	+ ·0002	4·5105	4·5107	− ·0002	397
398	69 16·5	69 18·2	− 1·7	1·7062	1·7044	+ ·0018	4·5094	4·5114	− ·0020	398
399	67 57·8	67 56·6	+ 1·2	1·7914	1·7930	− ·0016	4·4257	4·4253	+ ·0004	399
400	68 2·5	67 58·8	+ 3·7	..	..	..	..	..	..	400
401	68 22·2	68 17·3	+ 4·9	1·7737	1·7689	+ ·0048	4·4730	4·4424	+ ·0306	401
402	68 22·1	68 24·6	− 2·5	1·7624	1·7591	+ ·0033	4·4442	4·4452	− ·0010	402
403	67 16·7	67 19·6	− 2·9	1·8328	1·8292	+ ·0036	4·3768	4·3785	− ·0017	403
404	68 18·5	68 19·1	− 0·6	1·7769	1·7655	− ·0114	4·4670	4·4407	+ ·0263	404
405	69 3·9	69 3·2	+ 0·7	1.7134	1·7170	− ·0036	4·4787	4·4854	− ·0067	405
406	68 48·0	68 44·4	+ 3·6	1·7348	1·7365	− ·0017	4·4726	4·1630	+ ·0096	406
407	67 23·6	..	..	1·8242	..	..	..	..	..	407
408	69 16·8	69 21·0	− 4·2	1·7012	1·6991	+ ·0021	4·4971	4·5085	− ·0114	408
409	66 26·9	..	..	1·8862	..	..	..	..	..	409
410	66 25·2	..	..	1·8912	..	..	..	..	..	410
411	67 13·3	67 19·2	− 5·9	1·8406	1·8313	+ ·0093	4·3832	4·3822	+ ·0010	411
412	69 25·2	69 26·3	− 1·1	1·6928	1·6942	− ·0014	4·5085	4·5165	− ·0080	412

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
413		Halesowen	B	90	52 27 14	2 2 58	18 10·4	18 34·8	− 24·4	413
414		Halesworth	G	92	52 20 20	1 30 10E.	16 51·0	16 45·8	+ 5·2	414
415		Haltwhistle	,,	92	54 58 26	2 27 38	19 25·7	19 27·5	− 1·8	415
416		Hampton	W	92	52 28 32	2 23 1	18 37·6	18 45·1	− 7·5	416
417		Harbottle	G	92	55 19 52	2 5 50	19 12·1	19 19·8	− 7·7	417
418		Harby	,,	90	52 52 10	0 53 49	18 13·9	18 6·0	+ 7·9	418
419	88	Harpenden	T	87 & 88	51 47 27	0 21 15	17 45·1	17 34·0	+ 11·1	419
420		Harrogate	R & R	89	53 59 18	1 31 40	18 41·8	18 42·7	− 0·9	420
421	87	Harwich	T	86	51 56 48	1 17 5E.	16 48·6	16 47·6	+ 1·0	421
422	89	Haslemere	,,	87	51 6 4	0 44 40	17 36·1	17 33·8	+ 2·3	422
423		Hassock's Gate	B	90	50 55 40	0 9 5	17 21·1	17 14·8	+ 6·3	423
424		Haverfordwest	,,	90	51 47 57	4 57 9	19 30·2	19 48·8	− 18·6	424
425		Hawes	R & R	89	54 18 8	2 11 50	19 28·1	19 7·0	+ 21·1	425
426		Hay	G	91	52 4 40	3 7 54	18 59·3	19 0·6	− 1·3	426
427		Hayfield	R & T	90	53 22 40	1 55 53	18 36·4	18 46·7	− 10·3	427
428		Heathfield	B	90	50 58 32	0 16 7E.	17 5·1	17 3·6	+ 1·5	428
429		Helmsley	W	91	54 14 55	1 3 25	18 42·6	18 30·6	+ 12·0	429
430		Helston	G	90	50 5 15	5 15 35	19 28·1	19 19·3	+ 8·8	430
431		Hemyock	,,	90	50 55 15	3 13 32	18 43·0	18 40·6	+ 2·4	431
432		Henley-on-Thames	B	90	51 32 40	0 54 14	17 36·7	17 45·5	− 8·8	432
433*a*	203	Hereford	T	89	..	..	..	..	..	433*a*
433*b*		,,	G	91	52 1 56	2 43 40	18 57·0	18 47·8	+ 9·2	433*b*
434		Hesket Newmarket	W	92	54 44 29	3 1 48	19 53·5	19 43·4	+ 10·1	434
435		Hexham	,,	91	54 58 38	2 7 20	19 12·7	19 16·0	− 3·3	435
436		High Wycombe	R	92	51 38 50	0 43 31	18 5·4	17 42·2	+ 23·2	436
437		Hinckley	G	92	52 32 43	1 22 35	18 23·8	18 16·6	+ 7·2	437
438		Holsworthy	,,	90	50 48 58	4 20 40	19 16·0	19 9·7	+ 6·3	438
439		Holt	,,	90	52 53 43	1 5 28E.	17 14·1	17 5·5	+ 8·6	439
440	90	Holyhead	T	87	53 17 53	4 38 22	20 15·2	20 11·0	+ 4·2	440
441		Hopton Wafers (Cleobury Mortimer)	B	90	52 22 51	2 32 2	18 52·2	18 48·6	+ 3·6	441
442		Horncastle	R	89	53 12 30	0 6 15	17 52·4	17 46·3	+ 6·1	442
443	91	Horsham	,,	88	51 4 16	0 21 54	17 32·2	17 22·9	+ 9·3	443
444		Howden	,,	89	53 45 21	0 51 45	18 22·7	18 17·6	+ 5·1	444
445		Huddersfield	G	90	53 36 41	1 49 45	18 43·0	18 46·8	− 3·8	445
446	92	Hull	R	87	53 44 40	0 22 5	18 25·3	18 1·8	+ 23·5	446
447		Hunstanton	G	90	52 56 51	0 30 18E.	17 27·6	17 24·4	+ 3·2	447
448		Hythe	B	90	51 4 7	1 4 42E.	16 36·3	16 42·5	− 6·2	448
449	93	Ilfracombe	T	86	51 12 38	4 7 36	19 12·1	19 11·5	+ 0·6	449
450		Ilkley	R	89	53 55 44	1 49 38	18 39·8	18 51·7	− 11·9	450
451		Ilminster	G	90	50 55 27	2 54 40	18 30·4	18 31·6	− 1·2	451
452		Ipswich	,,	90	52 3 22	1 12 35E.	16 50·2	16 51·3	− 1·1	452
453		Ireby	W	92	54 44 31	3 10 58	19 53·1	19 48·5	+ 4·6	453
454	94	Jersey (Grouville)	T	88	49 12 5	2 1 20	18 4·3	..	..	454
455	95	,, (S. Louis)	,,	88	49 12 0	2 5 40	17 18·0	..	..	455
456	96	,, (S. Owen)	,,	88	49 13 30	2 12 5	17 53·0	..	..	456
457		Kegworth	G	92	52 50 10	1 15 10	18 9·6	18 17·0	− 7·4	457
458		Kendal	R & T	90	54 18 49	2 45 5	19 30·5	19 27·6	+ 2·9	458
459	97	Kenilworth	T	88	52 20 51	1 34 43	18 28·5	18 18·8	+ 9·7	459
460		Keswick	R & T	90	54 36 2	3 9 23	19 37·5	19 45·8	− 8·3	460
461	98	Kettering	T	88	52 23 44	0 44 10	18 3·8	17 54·4	+ 9·4	461
462		Kettlewell	R & R	89	54 8 53	2 2 51	18 50·5	19 2·0	− 11·5	462
463*a*	99	Kew	..	86	51 28 6	0 18 45	17 42·5	17 27·2	+ 15·3	463*a*
463*b*		,,	..	91	51 28 6	0 18 45	17 43·7	17 27·2	+ 16·5	463*b*
464		Kidderminster	B	90	52 22 49	2 15 27	18 29·7	18 40·0	− 10·3	464
465		King's Langley	R & T	90	51 43 43	0 26 59	17 50·7	17 35·6	+ 15·1	465
466*a*	100*a*	King's Lynn (*a*)	T	86	52 45 43	0 24 30E.	17 26·4	17 24·8	+ 1·6	466*a*

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
413	68° 17′·5	68° 17′·1	+ 0′·4	1·7725	1·7699	+ ·0026	4·4523	4·4443	+ ·0080	413
414	67 48·0	67 47·3	+ 0·7	1·7954	1·7961	− ·0007	4·3995	4·3987	+ ·0008	414
415	69 49·3	69 50·8	− 1·5	1·6682	1·6712	− ·0030	4·5394	4·5537	− ·0143	415
416	68 22·4	68 20·5	+ 1·9	1·7604	1·7689	− ·0085	4·4403	4·4545	− ·0142	416
417	69 54·0	70 0·7	− 6·7	1·6672	1·6601	+ ·0071	4·5559	4·5639	− ·0080	417
418	68 24·3	68 24·7	− 0·4	1·7680	1·7593	+ ·0087	4·4665	4·4461	+ ·0204	418
419	67 46·2	67 40·2	+ 6·0	1·8014	1·8074	− ·0060	4·4076	4·4003	+ ·0073	419
420	69 15·5	69 10·0	+ 5·5	1·7119	1·7117	+ ·0002	4·5204	4·4982	+ ·0222	420
421	67 32·5	67 33·6	− 1·1	1·8124	1·8119	+ ·0005	4·3845	4·3873	− ·0028	421
422	67 14·2	67 15·4	− 1·2	1·8384	1·8358	+ ·0026	4·3812	4·3794	+ ·0018	422
423	67 1·2	67 3·7	− 2·5	1·8495	1·8476	+ ·0019	4·3613	4·3654	− ·0041	423
424	68 15·9	68 13·1	+ 2·8	1·7789	1·7798	− ·0009	4·4622	4·4540	+ ·0082	424
425	69 32·4	69 25·8	+ 6·6	1·6892	1·6967	− ·0075	4·5275	4·5212	+ ·0063	425
426	68 15·4	68 10·7	+ 4·7	1·7712	1·7790	− ·0078	4·4411	4·4429	− ·0018	426
427	68 47·3	68 50·7	− 3·4	1·7324	1·7332	− ·0008	4·4636	4·4789	− ·0153	427
428	66 59·6	67 2·4	− 2·8	1·8471	1·8484	− ·0013	4·3501	4·3630	− ·0129	428
429	69 19·7	69 16·1	+ 3·6	1·7028	1·7046	− ·0018	4·5130	4·5036	+ ·0094	429
430	67 6·6	67 8·7	− 2·1	1·8470	1·8496	− ·0026	4·3746	4·3882	− ·0136	430
431	67 24·1	67 26·6	− 2·5	1·8284	1·8274	+ ·0010	4·3929	4·3994	− ·0065	431
432	67 37·9	67 33·5	+ 4·4	1·8164	1·8157	+ ·0007	4·4138	4·3961	+ ·0177	432
433*a*	68 9·1	68 6·1	+ 3·0	..	..	..	..	..	..	433*a*
433*b*	68 8·5	68 6·1	+ 2·4	1·7801	1·7833	− ·0032	4·4374	4·4365	+ ·0009	433*b*
434	69 48·0	69 46·4	+ 1·6	1·6744	1·6764	− ·0020	4·5509	4·5499	+ ·0010	434
435	69 46·5	69 49·0	− 2·5	1·6741	1·6725	+ ·0016	4·5440	4·5499	− ·0059	435
436	67 44·0	67 36·7	+ 7·3	1·8045	1·8117	− ·0072	4·4072	4·3980	+ ·0092	436
437	68 19·5	68 15·0	+ 4·5	1·7629	1·7700	− ·0071	4·4357	4·4403	− ·0046	437
438	67 32·3	67 30·8	+ 1·5	1·8218	1·8245	− ·0027	4·4066	4·4076	− ·0010	438
439	68 14·5	68 11·7	+ 2·8	1·7714	1·7695	+ ·0019	4·4381	4·4229	+ ·0152	439
440	69 16·7	69 6·5	+ 10·2	1·7064	1·7211	− ·0147	4·5108	4·5091	+ ·0017	440
441	68 17·6	68 17·9	− 0·3	1·7671	1·7701	− ·0030	4·4390	4·4476	− ·0086	441
442	68 34·4	68 31·6	+ 2·8	1·7502	1.7502	·0000	4·4600	4·4492	+ ·0108	442
443	67 8·8	67 11·2	− 2·4	1·8410	1·8397	+ ·0013	4·3682	4·3736	− ·0054	443
444	69 0·5	68 57·1	+ 3·4	1·7261	1·7243	+ ·0018	4·4986	4·4806	+ ·0180	444
445	69 3·8	68 58·4	+ 5·4	1·7202	1·7248	− ·0046	4·4961	4·4868	+ ·0093	445
446	68 58·3	68 53·5	+ 4·8	1·7220	1·7279	− ·0059	4·4793	4·4761	+ ·0032	416
447	68 21·2	68 17·8	+ 3·4	1·7641	1·7638	+ ·0003	4·4450	4·4315	+ ·0135	447
448	66 59·0	66 59·9	− 0·9	1·8489	1·8500	− ·0011	4·3522	4·3579	− ·0057	448
449	67 46·8	67 44·8	+ 2·0	1·8062	1·8093	− ·0031	4·4216	4·4219	− ·0003	449
450	69 14·0	69 9·8	+ 4·2	1·7115	1·7124	− ·0009	4·5135	4·4992	+ ·0143	450
451	67 20·5	67 24·2	− 3·7	1·8313	1·8294	+ ·0019	4·3868	4·3956	− ·0088	451
452	67 40·1	67 38·6	+ 1·5	1·8101	1·8065	+ ·0036	4·4066	4·3924	+ ·0142	452
453	69 53·3	69 47·4	+ 5·9	1·6653	1·6756	− ·0103	4·5478	4·5518	− ·0040	453
454	66 1·5	..	..	1·9168	..	..	..	..	..	454
455	66 5·8	..	..	1·9002	..	..	..	..	..	455
456	66 8·3	..	..	1·9019	..	..	..	..	..	456
457	68 29·6	68 26·1	+ 3·5	1·7572	1·7585	− ·0013	4·4593	4·4494	+ ·0099	457
458	69 32·3	69 29·2	+ 3·1	1·6903	1·6939	− ·0036	4·5302	4·5274	+ ·0028	458
459	68 22·6	68 10·0	+ 12·6	1·7676	1·7772	− ·0096	4·4591	4·4359	+ ·0232	459
460	69 40·6	69 42·4	− 1·8	1·6839	1·6808	+ ·0031	4·5464	4·5455	+ ·0009	460
461	68 4·6	68 5·7	− 1·1	1·7754	1·7801	− ·0047	4·4113	4·4270	− ·0157	461
462	69 20·8	69 19·1	+ 1·7	1·7063	1·7031	+ ·0032	4·5268	4·5115	+ ·0153	462
463*a*	67 31·1	67 26·5	+ 4·6	1·8216	1·8226	− ·0010	4·4020	4·3875	+ ·0145	463*a*
463*b*	67 31·7	67 26·5	+ 5·2	1·8198	1·8226	− ·0028	4·3994	4·3875	+ ·0119	463*b*
464	68 13·1	68 15·8	− 2·7	1·7698	1·7716	− ·0018	4·4289	4·4437	− ·0148	464
465	67 39·4	67 37·8	+ 1·6	1·8186	1·8103	+ ·0083	4·4246	4·3987	+ ·0259	465
466*a*	68 12·0	68 11·5	+ 0·5	1·7750	1·7714	+ ·0036	4·4378	4·4269	+ ·0109	466*a*

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
466*b*	100*b*	King's Lynn (Gaywood)	R	88	52 45 20	0 26 0E.	17 30·2	17 23·7	+ 6·5	466*b*
467	101	King's Sutton	T	88	52 1 9	1 16 19	18 19·4	18 4·2	+ 15·2	467
468		Kingswood	R	92	52 20 27	1 43 18	..	..	..	468
469		Kington	B	90	52 12 6	3 1 42	19 14·2	18 59·7	+ 14·5	469
470		Kirkby Lonsdale	R & T	90	54 11 59	2 35 58	19 16·8	19 21·0	− 4·2	470
471		Kirkby Stephen	R & R	89	54 28 21	2 21 0	19 22·7	19 14·4	+ 8·3	471
472		Knighton	W	92	52 20 31	3 3 2	19 16·5	19 3·1	+ 13·4	472
473	102	Lampeter	R	86	52 6 38	4 4 36	19 20·5	19 29·6	− 9·1	473
474		Lancaster	R & T	90	54 2 14	2 48 22	19 22·7	19 25·6	− 2·9	474
475		Launceston	G	90	50 38 48	4 20 57	19 3·9	19 6·5	− 2·6	475
476		Ledbury	,,	91	52 1 29	2 26 25	18 29·5	18 39·0	− 9·5	476
477	103	Leeds	R	86	53 50 58	1 35 3	18 35·3	18 42·6	− 7·3	477
478	104	Leicester	T	86	52 37 38	1 6 41	17 51·0	18 9·4	− 18·4	478
479		Leighton Buzzard	R & T	90	51 54 48	0 40 1	17 59·3	17 53·7	+ 5·6	479
480		Leominster	W	92	52 13 25	2 44 1	18 48·4	18 51·4	− 3·0	480
481		Levisham	G	92	54 18 20	0 43 13	18 29·0	18 20·2	+ 8·8	481
482		Lewes	B	90	50 51 50	0 0 50E.	17 14·0	17 9·5	+ 4·5	482
483		Lew Trenchard	G	90	50 39 17	4 12 37	19 6·0	19 2·7	+ 3·3	483
484		Lichfield	,,	92	52 41 18	1 50 37	18 44·2	18 32·5	+ 11·7	484
485*a*	105	Lincoln (*a*)	T	88	53 12 27	0 31 14	17 46·4	18 0·0	− 13·6	485*a*
485*b*		,, (*b*)	G	92	53 12 47	0 31 44	17 47·9	18 0·0	− 12·1	485*b*
486		Linton (Cambs.)	,,	90	52 5 53	0 16 43E.	17 31·4	17 19·5	+ 11·9	486
487		Lizard Down	,,	90	49 58 50	5 12 34	19 24·3	19 15·6	+ 8·7	487
488		Llandilo	W	92	51 52 38	3 59 56	19 20·3	19 22·5	− 2·2	488
489		Llandovery	B	90	51 59 31	3 47 58	19 13·1	19 18·8	− 5·7	489
490		Llandrindod	W	92	52 14 22	3 23 14	19 12·5	19 11·4	+ 1·1	490
491	106	Llandudno	R	86	53 19 5	3 50 23	20 16·4	19 46·6	+ 29·8	491
492		Llandyssil	B	90	52 2 21	4 18 12	19 39·1	19 34·7	+ 4·4	492
493		Llanelly	,,	90	51 41 58	4 9 48	19 13·7	19 23·5	− 9·8	493
494		Llanfair	W	92	52 39 49	3 18 0	19 21·2	19 17·1	+ 4·1	494
495		Llanfyllin	G	91	52 45 52	3 16 28	19 26·7	19 18·3	+ 8·4	495
496	107	Llangollen	R	86	52 58 23	3 10 13	19 33·8	19 19·0	+ 14·8	496
497	108	Llanidloes	,,	86	52 26 57	3 32 20	19 19·3	19 20·1	− 0·8	497
498		Longridge	W	91	53 49 17	2 35 44	19 10·8	19 15·0	− 4·2	498
499	109	Loughborough	T	88	52 46 37	1 13 3	17 46·0	18 15·2	− 29·2	499
500		Looe	G	90	50 21 20	4 27 24	19 6·6	19 3·1	+ 3·5	500
501		Louth	R	89	53 21 55	0 1 43	17 58·4	17 46·0	+ 12·4	501
502	110	Lowestoft	T	86	52 27 54	1 43 56E.	16 54·0	16 40·9	+ 13·1	502
503		Lynton	G	90	51 13 5	3 49 38	19 2·2	19 3·7	− 1·5	503
504*a*	111	Mablethorpe (*a*)	T	86	53 20 20	0 15 41E.	17 44·7	17 36·7	+ 8·0	504*a*
504*b*		,, (*b*)	G	92	53 20 15	0 15 41E.	17 40·2	17 36·7	+ 3·5	504*b*
505		Machynlleth	B	90	52 35 8	3 50 3	19 23·0	19 31·8	− 8·8	505
506		Maiden Newton	G	90	50 46 30	2 34 35	18 15·4	18 19·5	− 4·1	506
507		Maidstone	B	90	51 16 57	0 32 12E.	17 1·7	17 0·3	+ 1·4	507
508		Malton	R	89	54 8 2	0 48 8	18 40·4	18 20·8	+ 19·6	508
509	112	Malvern	..	..	..	..	..	..	..	509
509*a*	112*a*	,, Colwall Green	R	86	52 4 0	2 21 40	18 30·3	18 37·7	− 7·4	509*a*
509*b*	112*b*	,, Great Malvern	,,	86	52 6 22	2 18 10	18 59·7	18 36·5	+ 23·2	509*b*
509*c*	112*c*	,, Malvern Wells	,,	86	52 4 49	2 18 30	18 49·1	18 36·1	+ 13·0	509*c*
509*d*	112*d*	,, Mathon	,,	86	52 6 40	2 22 6	18 13·2	18 37·9	− 24·7	509*d*
510	113	Manchester (Old Trafford)	T	86	53 27 40	2 16 54	18 42·8	18 59·3	− 16·5	510
511		Mansfield	G	92	53 8 18	1 11 29	18 26·0	18 19·6	+ 6·4	511
512	114	Manton	T	88	52 37 32	0 41 51	17 49·5	17 56·6	− 7·1	512
513		Marazion	G	90	50 8 15	5 29 11	19 33·8	19 26·6	+ 7·2	513
514	115	March	R	88	52 32 0	0 4 0E.	17 31·3	17 32·0	− 0·7	514
515		Margate	B	90	51 22 13	1 21 45E.	16 33·5	16 38·7	− 5·2	515
516		Market Bosworth	G	92	52 37 37	1 24 12	18 13·2	18 18·3	− 5·1	516
517		Market Drayton	W	92	52 54 27	2 29 6	18 38·9	18 56·3	− 17·4	517
518		Market Harboro'	G	90	52 28 20	0 56 8	18 2·2	18 1·3	+ 0·9	518

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
466*b*	68° 11′·0	68° 11′·0	0′·0	1·7740	1·7719	+ ·0021	4·4315	4·4263	+ ·0052	466*b*
467	68 0·1	67 55·2	+ 4·9	1·7878	1·7927	− ·0049	4·4254	4·4193	+ ·0061	467
468	68 21·3	68 10·5	+ 10·8	1·7672	1·7766	− ·0094	4·4533	4·4362	+ ·0171	468
469	..	..	..	1·7725	1·7747	− ·0022	..	..	..	469
470	69 24·7	69 24·8	− 0·1	1·7000	1·6982	+ ·0018	4·5256	4·5212	+ ·0044	470
471	69 35·6	69 32·7	+ 2·9	1·6838	1·6898	− ·0060	4·5260	4·5304	− ·0044	471
472	68 19·2	68 20·0	− 0·8	1·7694	1·7687	+ ·0007	4·4508	4·4520	− ·0012	472
473	68 18·8	68 18·8	0·0	1·7666	1·7723	− ·0057	4·4423	4·4567	− ·0144	473
474	69 18·2	69 20·5	− 2·3	1·7057	1·7029	+ ·0028	4·5148	4·5166	− ·0018	474
475	67 19·0	67 24·0	− 5·0	1·8405	1·8318	+ ·0087	4·4035	4·4007	+ ·0028	475
476	68 8·4	68 3·6	+ 4·8	1·7782	1·7854	− ·0072	4·4323	4·4324	− ·0001	476
477	69 5·0	69 5·4	− 0·4	1·7180	1·7166	+ ·0014	4·4950	4·4929	+ ·0021	477
478	68 18·0	68 17·2	+ 0·8	1·7636	1·7683	− ·0047	4·4317	4·4407	− ·0090	478
479	67 51·2	67 46·4	+ 4·8	1·7973	1·8010	− ·0037	4·4159	4·4073	+ ·0086	479
480	68 14·1	68 13·2	+ 0·9	1·7764	1·7752	+ ·0012	4·4492	4·4428	+ ·0064	480
481	69 16·9	69 16·0	+ 0·9	1·7018	1·7042	− ·0024	4·4994	4·5022	− ·0028	481
482	66 59·7	66 59·4	+ 0·3	1·8532	1·8517	+ ·0015	4·3649	4·3602	+ ·0047	482
483	67 19·5	67 23·1	− 3·6	1·8399	1·8326	+ ·0073	4·4038	4·3994	+ ·0044	483
484	68 33·3	68 24·5	+ 8·8	1·7498	1·7613	− ·0115	4·4546	4·4504	+ ·0042	484
485*a*	68 37·2	68 34·8	+ 2·4	1·7491	1·7478	+ ·0013	4·4677	4·4553	+ ·0124	485*a*
485*b*	68 35·4	68 34·8	+ 0·6	1·7481	1·7478	+ ·0003	4·4584	4·4553	+ ·0031	485*b*
486	67 50·3	67 46·9	+ 3·4	1·7950	1·7986	− ·0036	4·4069	4·4032	+ ·0037	486
487	67 0·7	67 4·0	− 3·3	1·8523	1·8538	− ·0015	4·3663	4·3814	− ·0151	487
488	68 19·4	68 9·4	+ 10·0	1·7688	1·7820	− ·0132	4·4501	4·4456	+ ·0045	488
489	68 18·0	68 12·4	+ 5·6	1·7697	1·7785	− ·0088	4·4470	4·4481	− ·0011	489
490	68 19·4	68 18·7	+ 0·7	1·7703	1·7708	− ·0005	4·4539	4·4525	+ ·0014	490
491	69 5·7	69 1·7	+ 4·0	1·7188	1·7249	− ·0061	4·5000	4·5002	− ·0002	491
492	68 20·2	68 17·8	+ 2·4	1·7697	1·7737	− ·0040	4·4553	4·4564	− ·0011	492
493	68 4·9	68 3·6	+ 1·3	1·7901	1·7887	+ ·0014	4·4489	4·4406	+ ·0083	493
494	68 37·0	68 33·7	+ 3·3	1·7495	1·7545	− ·0050	4·4680	4·4682	− ·0002	494
495	68 38·7	68 37·6	+ 1·1	1·7472	1·7500	− ·0028	4·4687	4·4716	− ·0029	495
496	68 43·2	68 44·6	− 1·4	1·7433	1·7422	+ ·0011	4·4759	4·4786	− ·0027	496
497	68 27·3	68 27·6	− 0·3	1·7605	1·7614	− ·0009	4·4590	4·4624	− ·0034	497
498	69 11·3	69 11·3	0·0	1·7132	1·7128	+ ·0004	4·5072	4·5062	+ ·0010	498
499	68 21·7	68 23·6	− 1·9	1·7629	1·7613	+ ·0016	4·4440	4·4469	− ·0029	499
500	67 11·8	67 13·5	− 1·7	1·8424	1·8431	− ·0007	4·3823	4·3900	− ·0077	500
501	68 39·9	68 36·9	+ 3·0	1·7427	1·7443	− ·0016	4·4617	4·4543	+ ·0074	501
502	67 54·7	67 50·5	+ 4·2	1·7889	1·7921	− ·0032	4·4081	4·4005	+ ·0076	502
503	67 42·4	67 42·7	− 0·3	1·8091	1·8109	− ·0018	4·4124	4·4179	− ·0055	503
504*a*	68 37·0	68 34·0	+ 3·0	1·7464	1·7471	− ·0007	4·4601	4·4505	+ ·0096	504*a*
504*b*	68 40·2	68 34·0	+ 6·2	1·7460	1·7471	− ·0011	4·4713	4·4505	+ ·0208	504*b*
505	68 33·2	68 34·6	− 1·4	1·7549	1·7542	+ ·0007	4·4672	4·4709	− ·0037	505
506	67 14·1	67 15·5	− 1·4	1·8392	1·8381	+ ·0011	4·3828	4·3852	− ·0024	506
507	67 10·4	67 12·6	− 2·2	1·8389	1·8398	− ·0009	4·3689	4·3788	− ·0099	507
508	..	..	..	1·7103	1·7101	+ ·0002	..	..	..	508
509	..	..	..	..	..	..	..	..	..	509
509*a*	..	..	..	1·7729	1·7840	− ·0111	..	..	..	509*a*
509*b*	68 8·0	68 5·9	+ 2·1	1·7789	1·7825	− ·0036	4·4326	4·4337	− ·0011	509*b*
509*c*	..	..	..	1·7784	1·7836	− ·0052	..	..	..	509*c*
509*d*	..	..	..	1·7757	1·7825	− ·0068	..	..	..	509*d*
510	68 57·9	68 56·2	+ 1·7	1·7225	1·7281	− ·0056	4·4791	4·4870	− ·0079	510
511	68 43·1	68 36·8	+ 6·3	1·7387	1·7468	− ·0081	4·4638	4·4604	+ ·0034	511
512	68 11·1	68 14·2	− 3·1	1·7758	1·7707	+ ·0051	4·4364	4·4353	+ ·0011	512
513	67 10·4	67 12·5	− 2·1	1·8444	1·8460	− ·0016	4·3820	4·3933	− ·0113	513
514	68 4·3	68 5·1	− 0·8	1·7815	1·7791	+ ·0024	4·4254	4·4223	+ ·0031	514
515	67 12·9	67 9·4	+ 3·5	1·8348	1·8385	− ·0037	4·3681	4·3644	+ ·0037	515
516	68 22·5	68 19·2	+ 3·3	1·7598	1·7664	− ·0066	4·4390	4·4432	− ·0042	516
517	68 44·4	68 36·4	+ 8·0	1·7379	1·7487	− ·0108	4·4666	4·4638	+ ·0028	517
518	68 8·5	68 9·8	− 1·3	1·7763	1·7758	+ ·0005	4·4279	4·4316	− ·0037	518

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
519		Market Rasen	R	89	53 23 10	0 20 35	17 56·9	17 56·0	+ 0·9	519
520		,, Weighton	,,	89	53 51 48	0 40 0	18 39·3	18 12·8	+ 26·5	520
521		Marlborough	,,	92	51 23 45	1 41 55	17 35·9	18 6·4	− 30·5	521
522		Maryport	,,	91	54 43 33	3 29 0	19 57·3	19 38·5	+ 18·8	522
523		Masham	R & R	89	54 13 17	1 39 0	18 45·2	18 50·1	− 4·9	523
524		Matlock	G	90	53 9 32	1 34 55	18 25·5	18 32·2	− 6·7	524
525	116	Melton Mowbray	T	88	52 44 54 52 45 47	0 52 46 0 53 20	18 38·4 18 31·7	18 4·1 18 4·6	+ 34·3 + 27·1	525
526		Middlewich	W	91	53 10 42	2 27 37	18 47·5	19 0·1	− 12·6	526
527*a*	117	Milford (*a*)	R	87	51 42 24	4 56 47	19 33·3	19 46·7	− 13·4	527*a*
527*b*		,, (*b*)	W	92	51 42 20	4 56 50	19 27·3	19 46·7	− 19·4	527*b*
528		Millom	,,	92	54 12 27	3 16 8	19 36·3	19 43·2	− 6·9	528
529		Milnthorpe	R & T	90	54 13 32	2 46 23	19 26·7	19 27·2	− 0·5	529
530		Minehead	G	90	51 11 54	3 28 20	18 48·1	18 52·7	− 4·6	530
531		Monkswood (Usk)	B	90	51 43 14	2 56 40	18 54·7	18 47·8	+ 6·9	531
532		Monmouth	,,	90	51 48 27	2 42 47	18 48·5	18 43·0	+ 5·5	532
533		Montgomery	W	92	52 33 32	3 8 35	19 19·8	19 10·2	+ 9·6	533
534		Moreton Hampstead	G	90	50 39 23	3 46 15	18 51·8	18 50·4	+ 1·4	534
535		Moreton-in-the-Marsh	R	92	51 59 24	1 41 40	17 45·6	18 16·5	− 30·9	535
536		Morpeth	W	91	55 10 35	1 41 38	18 58·7	19 3·7	− 5·0	536
537		Moseley	B	90	52 26 44	1 53 40	18 12·5	18 30·2	− 17·7	537
538		Mullion	G	90	50 1 42	5 14 32	19 18·6	19 17·5	+ 1·1	538
539		Neath	B	90	51 39 43	3 47 18	19 7·9	19 11·6	− 3·7	539
540	118	Newark	T	88	53 4 35	0 48 43	18 13·6	18 6·9	+ 6·7	540
541		Newbury	G	90	51 24 12	1 19 40	17 41·4	17 55·3	− 13·9	541
542	119	Newcastle	R	86	54 59 25	1 39 44	18 56·0	19 0·1	− 4·1	542
543		Newport (Mon.)	B	90	51 34 43	3 0 52	18 50·3	18 47·4	+ 2·9	543
544		,, (Salop)	W	92	52 45 31	2 22 0	19 5·9	18 50·3	+ 15·6	544
545		,, Pagnell	R & T	90	52 4 51	0 43 47	18 4·9	17 49·1	+ 15·8	545
546		New Radnor	B	90	52 14 29	3 8 49	19 13·7	19 4·3	+ 9·4	546
547		Newton-le-Willows	W	91	53 27 38	2 37 3	19 3·6	19 10·0	− 6·4	547
548		Newtown (Mont.)	,,	92	52 31 9	3 18 36	19 21·8	19 14·8	+ 7·0	548
549	120	Northampton	T	86	52 13 1	0 53 52	18 9·5	17 56·5	+ 13·0	549
550	121	Nottingham	,,	86	52 57 0	1 9 20	18 12·0	18 15·6	− 3·6	550
551		Oswestry	B	90	52 51 11	3 4 12	19 27·7	19 13·6	+ 14·1	551
552		Oundle	G	92	52 29 8	0 28 58	17 34·3	17 47·6	− 13·3	552
553*a*	122	Oxford (*a*)	R	86	51 45 34	1 15 6	18 1·4	17 59·3	+ 2·1	553*a*
553*b*		,, (*b*)	,,	92	51 45 34	1 15 6	17 59·1	17 59·3	− 0·2	553*b*
554		Pantyffynnon	W	92	51 46 35	4 0 16	19 14·5	19 20·3	− 5·8	554
555		Pateley Bridge	R	89	54 5 20	1 45 53	18 42·8	18 51·9	− 9·1	555
556		Penrith	R & T	90	54 39 28	2 44 47	19 26·1	19 32·7	− 6·6	556
557		Penwyllt	W	92	51 49 35	3 40 0	19 13·5	19 11·6	+ 1·9	557
558	123	Peterborough	T	86	52 34 16	0 15 57	17 50·1	17 42·8	+ 7·3	558
559		Pickering	G	92	54 14 32	0 46 30	18 38·5	18 21·3	+ 17·2	559
560		Plashetts	W	91	55 12 5	2 31 35	19 29·1	19 33·1	− 4·0	560
561	124	Plymouth	T	87	50 21 59	4 8 35	18 57·6	18 54·5	+ 3·1	561
562		Pocklington	R	89	53 55 43	0 46 6	18 37·9	18 16·9	+ 21·0	562
563		Point of Ayre (Isle of Man)	W	92	54 24 19	4 21 41	20 18·7	20 22·5	− 3·3	563
564		Pontefract	R	89	53 40 28	1 17 40	18 36·8	18 30·5	+ 6·3	564
565		Pontrilas	W	92	51 56 40	2 52 46	19 9·7	18 50·4	+ 19·3	565
566		Pontypool	,,	92	51 42 19	3 1 58	18 52·8	18 50·2	+ 2·6	566
567		Pontypridd	B	90	51 36 12	3 19 42	18 50·9	18 57·1	− 6·2	567
568	125	Port Erin	T	87	54 5 4	4 46 7	20 19·0	20 30·7	− 11·7	568
569		Porthallow	G	90	50 4 20	5 4 53	19 22·3	19 14·0	+ 8·3	569
570		Portmadoc	,,	91	52 55 20	4 7 50	19 24·8	19 47·9	− 23·1	570
571	126	Preston	R	86	53 42 46	2 43 18	19 17·8	19 17·4	+ 0·4	571
572	127	Purfleet	,,	88	51 29 7	0 14 58E.	17 23·7	17 11·7	+ 12·0	572
573	128	Pwllheli	,,	86	52 52 55	4 24 35	20 6·4	19 55·8	+ 10·6	573

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
	° ′	° ′	′							
519	68 46·4	68 40·0	+ 6·4	1·7400	1·7418	− ·0018	4·4798	4·4598	+ ·0200	519
520	69 6·0	68 59·6	+ 6·4	1·7237	1·7212	+ ·0025	4·5140	4·4823	+ ·0317	520
521	67 39·6	67 34·1	+ 5·5	1·8134	1·8167	− ·0033	4·4128	4·4008	+ ·0120	521
522	69 53·1	69 48·5	+ 4·6	1·6636	1·6746	− ·0110	4·5423	4·5535	− ·0112	522
523	69 27·4	69 19·0	+ 8·4	1·6937	1·7026	− ·0089	4·5195	4·5097	+ ·0098	523
524	68 41·5	68 40·2	+ 1·3	1·7457	1·7439	+ ·0018	4·4750	4·4659	+ ·0091	524
525	68 21·8	68 20·1	+ 1·7	1·7717	1·7646	+ ·0071	4·4665	4·4422	+ ·0243	525
	68 30·0	68 20·7	+ 9·3	1·7512	1·7639	− ·0127	4·4457	4·4426	+ ·0031	
526	68 45·2	68 47·1	− 1·9	1·7414	1·7382	+ ·0032	4·4789	4·4779	+ ·0010	526
527*a*	68 2·9	68 9·7	− 6·8	1·7918	1·7835	+ ·0083	4·4456	4·4504	− ·0048	527*a*
527*b*	68 3·5	68 9·7	− 6·2	1·7907	1·7835	+ ·0072	4·4453	4·4504	− ·0051	527*b*
528	69 32·9	69 29·6	+ 3·3	1·6923	1·6944	− ·0021	4·5380	4·5303	+ ·0077	528
529	69 25·7	69 26·8	− 1·1	1·7002	1·6964	+ ·0038	4·5301	4·5244	+ ·0057	529
530	67 40·2	67 39·3	+ 0·9	1·8120	1·8137	− ·0017	4·4115	4·4125	− ·0010	530
531	67 55·2	67 55·6	− 0·4	1·7935	1·7953	− ·0018	4·4212	4·4273	− ·0061	531
532	67 57·7	67 57·5	+ 0·2	1·7910	1·7927	− ·0017	4·4244	4·4278	− ·0034	532
533	68 32·2	68 28·8	+ 3·4	1·7539	1·7593	− ·0054	4·4608	4·4617	− ·0009	533
534	67 17·2	67 20·2	− 3·0	1·8400	1·8353	+ ·0047	4·3958	4·3953	+ ·0005	534
535	68 6·3	67 57·2	+ 9·1	1·7776	1·7911	− ·0135	4·4230	4·4227	+ ·0003	535
536	69 52·1	69 52·9	− 0·8	1·6684	1·6678	+ ·0006	4·5513	4·5529	− ·0016	536
537	68 13·7	68 17·4	− 3·7	1·7746	1·7713	+ ·0033	4·4431	4·4489	− ·0058	537
538	67 20·0	67 6·2	+ 13·8	1·8399	1·8522	− ·0123	4·4057	4·3855	+ ·0202	538
539	67 56·5	67 59·7	− 3·2	1·7960	1·7923	+ ·0037	4·4323	4·4350	− ·0027	539
540	68 27·6	68 32·0	− 4·4	1·7560	1·7514	+ ·0046	4·4487	4·4538	− ·0051	540
541	67 30·5	67 31·4	− 0·9	1·8284	1·8188	+ ·0096	4·4160	4·3959	+ ·0201	541
542	69 44·0	69 46·3	− 2·3	1·6762	1·6746	+ ·0016	4·5395	4·5445	− ·0050	542
543	67 49·1	67 50·7	− 1·6	1·8029	1·8007	+ ·0022	4·4219	4·4224	− ·0005	543
544	68 20·8	68 30·8	− 10·0	1·7718	1·7555	+ ·0163	4.4629	4·4596	+ ·0033	544
545	68 4·1	67 53·5	+ 10·6	1·7798	1·7932	− ·0134	4·4204	4·4140	+ ·0064	545
546	68 14·6	68 16·9	− 2·3	1·7760	1·7723	+ ·0037	4·4500	4·4495	+ ·0005	546
547	68 57·8	68 58·3	− 0·5	1·7304	1·7266	+ ·0038	4·4992	4·4911	+ ·0081	547
548	68 34·4	68 28·6	+ 5·8	1·7521	1·7601	− ·0080	4·4648	4·4629	+ ·0019	548
549	68 3·3	68 0·1	+ 3·2	1·7766	1·7867	− ·0101	4·4094	4·4226	− ·0132	549
550	68 31·7	68 29·7	+ 2·0	1·7568	1·7546	+ ·0022	4·4667	4·4532	+ ·0135	550
551	68 35·7	68 35·8	− 0·1	1·7490	1·7477	+ ·0013	4·4618	4·4589	+ ·0029	551
552	67 56·5	68 7·4	− 10·9	1·7921	1·7775	+ ·0146	4·4226	4·4269	− ·0043	552
553*a*	67 51·2	67 45·3	+ 5·9	1·7991	1·8038	− ·0047	4·4204	4·4102	+ ·0102	553*a*
553*b*	67 53·5	67 45·3	+ 8·2	1·7907	1·8038	− ·0131	4·4081	4·4106	− ·0025	553*b*
554	68 10·6	68 5·6	+ 5·0	1·7782	1·7863	− ·0081	4·4406	4·4420	− ·0014	554
555	69 19·9	69 15·0	+ 4·9	1·7070	1·7066	+ ·0004	4·5249	4·5044	+ ·0205	555
556	69 38·1	69 41·9	− 3·8	1·6802	1·6808	− ·0006	4·5264	4·5434	− ·0170	556
557	68 8·6	68 5·2	+ 3·4	1·7837	1·7862	− ·0025	4·4468	4·4403	+ ·0065	557
558	68 8·8	68 9·0	− 0·2	1·7789	1·7756	+ ·0033	4·4356	4·4281	+ ·0075	558
559	69 17·3	69 14·0	+ 3·3	1·7040	1·7064	− ·0024	4·5066	4·5000	+ ·0066	559
560	69 56·0	69 58·9	− 2·9	1·6638	1·6625	+ ·0013	4·5547	4·5631	− ·0084	560
561	67 7·5	67 11·5	− 4·0	1·8423	1·8451	− ·0028	4·3667	4·3875	− ·0208	561
562	69 9·7	69 2·9	+ 6·8	1·7098	1·7180	− ·0082	4·4921	4·4868	+ ·0053	562
563	69 51·6	69 43·7	+ 7·9	1·6660	1·6815	− ·0155	4·5428	4·5526	− ·0098	563
564	68 57·1	68 57·0	+ 0·1	1·7240	1·7253	− ·0013	4·4799	4·4828	− ·0029	564
565	68 2·2	68 3·7	− 1·5	1·7898	1·7862	+ ·0036	4·4380	4·4348	+ ·0032	565
566	67 58·3	67 57·4	+ 0·9	1·7926	1·7955	− ·0029	4·4305	4·4343	− ·0038	566
567	67 53·0	67 53·8	− 0·8	1·7981	1·7982	− ·0001	4·4245	4·4277	− ·0032	567
568	69 41·9	69 35·2	+ 6·7	1·6783	1·6907	− ·0124	4·5366	4·5430	− ·0064	568
569	67 5·5	67 6·4	− 0·9	1·8470	1·8515	− ·0045	4·3707	4·3845	− ·0138	569
570	68 47·2	68 49·1	− 1·9	1·7493	1·7389	+ ·0104	4·5068	4·4873	+ ·0195	570
571	69 8·7	69 8·3	+ 0·4	1·7154	1·7151	+ ·0003	4·5029	4·5004	+ ·0025	571
572	67 24·6	67 23·0	+ 1·6	1·8232	1·8254	− ·0022	4·3821	4·3817	+ ·0004	572
573	68 44·4	68 49·8	− 5·4	1·7512	1·7389	+ ·0123	4·5009	4·4900	+ ·0109	573

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
574		Radstock	G	90	51 18 12	2 28 30	18 26·0	18 26·1	− 0·1	574
575		Ramsey (Hunts)	,,	92	52 26 50	0 6 50	17 29·3	17 36·1	− 6·8	575
576	129	,, (Isle of Man)	T	87	54 19 22	4 22 48	20 18·7	20 22·3	− 3·6	576
577	130	Ranmore	,,	88	51 14 38	0 21 36	17 37·7	17 25·4	+ 12·3	577
578		Ravenglass	W	91	54 21 30	3 25 40	19 50·8	19 50·8	0·0	578
579*a*	131*a*	Reading, Caversham (*a*)	T	86	51 27 57	0 58 46	17 43·3	17 46·7	− 3·4	579*a*
579*b*	131*b*	,, ,, (*b*)	,,	88	51 27 56	0 58 50	17 39·7	17 46·7	− 7·0	579*b*
580*a*	132*a*	Redcar (*a*)	R	86	54 34 33	1 0 22	18 32·0	18 33·2	− 1·2	580*a*
580*b*	132*b*	,, (*b*)	,,	86	54 35 46	1 1 15				580*b*
581		Retford	G	90	53 19 58	0 57 0	18 11·5	18 14·6	− 3·1	581
582		Rhayader	,,	91	52 17 57	3 30 31	19 8·9	19 16·0	− 7·1	582
583		Rhyl	B	90	53 19 33	3 29 12	19 41·4	19 35·0	+ 6·4	583
584		Richmond (Yorks)	R & R	89	54 24 29	1 44 0	18 47·4	18 55·3	− 7·9	584
585		Riverhead (Sevenoaks)	T & G	90	51 16 57	0 10 5E.	17 13·2	17 11·0	+ 2·2	585
586		Rochdale	W	91	53 37 9	2 11 13	18 34·6	18 58·7	− 24·1	586
587		Rockingham	G	92	52 30 50	0 43 10	18 2·5	17 55·1	+ 7·4	587
588*a*	204	Ross (*a*)	T	89	..	..	..	..	..	588*a*
588*b*		,, (*b*)	W	92	51 54 58	2 36 13	18 34·7	18 41·7	− 7·0	588*b*
589		Rushbury	,,	92	52 31 5	2 42 24	18 48·3	18 56·0	− 7·7	589
590		Ruthin	G	91	53 7 4	3 18 41	19 29·8	19 25·8	+ 4·0	590
591	133	Ryde	T	86	50 43 13	1 10 44	17 29·9	17 39·9	− 10·0	591
592	134	St. Cyres	T	86	50 46 30	3 35 26	18 54·8	18 47·4	+ 7·4	592
593*a*	135	St. Leonard's (*a*)	R	86	50 50 56	0 31 5E.	16 54·5	16 55·0	− 0·5	593*a*
593*b*		,, ,, (*b*)	,,	92	50 50 56	0 31 5E.	16 55·3	16 55·0	+ 0·3	593*b*
594		St. Levan	G	90	50 2 50	5 39 17	19 38·8	19 28·0	+ 10·8	594
595		St. Neot's	,,	90	52 12 57	0 16 10	17 36·1	17 37·6	− 1·5	595
596*a*	136	Salisbury	T	86	51 5 3	1 48 6	17 51·5	18 3·4	− 11·9	596*a*
596*b*		,,	W	92	51 5 3	1 48 6	17 50·5	18 3·4	− 12·8	596*b*
597		,, Plain	G	90	51 10 54	1 49 45	17 53·1	18 6·0	− 12·9	597
598		Salkeld (Great)	,,	92	54 43 14	2 42 0	19 36·6	19 31·8	+ 4·8	598
599		Santon (Isle of Man)	W	92	54 7 12	4 35 9	20 8·6	20 25·5	− 16·9	599
600		Saxmundham	G	92	52 12 45	1 29 46E.	16 46·6	16 44·8	+ 1·8	600
601	137	Scarborough	R	86	54 15 55	0 23 24	18 15·5	18 8·7	+ 6·8	601
602		Sedbergh	R & T	90	54 19 17	2 31 40	19 27·0	19 20·7	+ 6·3	602
603		Sedgefield	G	92	54 39 5	1 29 22	18 49·9	18 50·3	− 0·4	603
604		Selby	R	89	53 46 49	1 5 4	18 19·6	18 25·3	− 5·7	604
605		Shap	R & T	90	54 31 12	2 40 15	19 34·9	19 27·7	+ 7·2	605
606		Sheerness	W	91	51 25 25	0 47 0E.	16 57·0	16 56·0	+ 1·0	606
607		Sheffield	G	90	53 21 55	1 26 42	18 53·5	18 30·6	+ 22·9	607
608		Shifnal	B	90	52 39 40	2 22 7	18 39·1	18 48·6	− 9·5	608
609		Shoreham (Kent)	,,	90	51 20 8	0 10 54E.	17 13·5	17 11·1	+ 2·4	609
610	138	Shrewsbury	R	86	52 42 11	2 45 36	19 7·2	19 1·3	+ 5·9	610
611		Sidmouth	G	90	50 40 28	3 14 42	18 39·4	18 36·1	+ 3·3	611
612		Silloth	W	92	54 52 14	3 22 51	19 53·3	19 57·4	− 4·1	612
613		Sittingbourne	G	90	51 20 17	0 44 18E.	16 53·7	16 55·4	− 1·7	613
614		Skipton	R & R	89	53 56 50	2 1 22	18 44·3	18 58·4	− 14·1	614
615		Sleaford	G	90	53 0 55	0 25 18	17 32·1	17 54·0	− 21·9	615
616		Snodland	B	90	51 19 50	0 26 2E.	17 4·3	17 2·4	+ 1·9	616
617		Southampton	G	90	50 55 49	1 23 40	17 41·7	17 49·2	− 7·5	617
618	139	Southend	T	87	51 32 49	0 43 11E.	17 14·0	16 58·8	+ 15·2	618
619		Southport	W	91	53 39 17	2 57 28	19 20·3	19 23·9	− 3·6	619
620*a*	140	Spalding (*a*)	T	88	52 47 5	0 8 48	17 19·8	17 42·2	− 22·4	620*a*
620*b*		,, (*b*)	G	92	52 47 5	0 8 48	17 19·9	17 42·2	− 22·3	620*b*
621		Spilsby	R	89	53 10 28	0 5 59E.	17 52·9	17 39·6	+ 13·3	621
622		Stafford	G	92	52 49 35	2 7 5	18 37·1	18 43·8	− 6·7	622
623		Stalbridge	,,	90	50 57 35	2 22 54	18 18·2	18 17·5	+ 0·7	623
624		Stamford	,,	90	52 39 20	0 29 20	18 6·6	17 51·2	+ 15·4	624
625		Stanmore	R & T	90	51 36 54	0 18 35	17 36·8	17 29·8	+ 7·0	625
626		Stockton-on-Tees	G	92	54 34 22	1 19 30	18 42·8	18 43·8	− 1·0	626
627	141	Stoke-on-Trent	R	87	52 57 47	2 12 20	18 49·0	18 48·7	+ 0·3	627
628		Stokesley	W	91	54 27 55	1 11 22	18 42·3	18 37·3	+ 5·0	628

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
574	67° 35′·0	67° 35′·8	− 0′·8	1 8148	1·8160	− ·0012	4·3994	4·4052	− ·0058	574
575	68 5·4	68 3·1	+ 2·3	1·7791	1·7816	− ·0025	4·4234	4·4211	+ ·0023	575
576	69 48·9	69 41·0	+ 7·9	1·6721	1·6845	− ·0124	4·5483	4·5497	− ·0014	576
577	67 13·6	67 18·0	− 4·4	1·8361	1·8321	+ ·0040	4·3736	4·3798	− ·0062	577
578	69 36·7	69 35·7	+ 1·0	1·6868	1·6880	− ·0012	4·5385	4·5377	+ ·0008	578
579*a*	67 34·4	67 31·6	+ 2·8	1·8211	1·8182	+ ·0029	4·4124	4·3953	+ ·0171	579*a*
579*b*	..	..	..	1·8242	1·8182	+ ·0060	..	..	..	579*b*
580*a* 580*b*	69 26·1	69 28·0	− 1·9	1·6942	1·6929	+ ·0013	4·5157	4·5198	− ·0041	580*a* 580*b*
581	68 41·6	68 42·1	− 0·5	1·7460	1·7406	+ ·0054	4·4766	4·4648	+ ·0118	581
582	68 26 3	68 21·8	+ 4·5	1·7617	1·7677	− ·0060	4·4582	4·4565	+ ·0017	582
583	68 57·1	68 59·6	− 2·5	1·7253	1·7265	− ·0012	4·4832	4·4961	− ·0129	583
584	69 31·5	69 26·1	+ 5·4	1·6879	1·6954	− ·0075	4·5205	4·5189	+ ·0016	584
585	67 10·0	67 15·4	− 5·4	1·8397	1·8342	+ ·0055	4·3694	4·3755	− ·0061	585
586	69 8·1	69 1·2	+ 6·9	1·7175	1·7224	− ·0049	4·5060	4·4917	+ ·0143	586
587	68 4·6	68 9·9	− 5·3	1·7798	1·7751	+ ·0047	4·4222	4·4302	− ·0080	587
588*a*	68 0·4	68 1·0	− 0·6	..	..	..	..	..	..	588*a*
588*b*	68 3·5	68 1 0	+ 2·5	1·7858	1·7887	− ·0029	4·4330	4·4309	+ ·0021	588*b*
589	68 28·3	68 24·4	+ 3·9	1·7586	1·7632	− ·0046	4·4580	4·4548	+ ·0032	589
590	68 53·8	68 50·7	+ 3·1	1·7322	1·7356	− ·0034	4·4883	4·4851	+ ·0032	590
591	67 1·2	67 3·1	− 1·9	1·8496	1·8499	− ·0003	4·3613	4·3691	− ·0078	591
592	67 19·2	67 23·6	− 4·4	1·8372	1·8313	+ ·0059	4·3963	4·3980	− ·0017	592
593*a*	66 52·5	66 55·2	− 2·7	1·8537	1·8555	− ·0018	4·3407	4·3543	− ·0136	593*a*
593*b*	66 53·7	66 55·2	− 1·5	1·8514	1·8555	− ·0041	4·3395	4·3543	− ·0148	593*b*
594	67 8·5	67 10·1	− 1·6	1·8434	1·8486	− ·0052	4·3729	4·3909	− ·0180	594
595	67 58·8	67 55·5	+ 3·3	1·7846	1·7903	− ·0057	4·4127	4·4145	− ·0018	595
596*a*	67 19·0	67 22·2	− 3·2	1·8347	1·8300	+ ·0047	4·3897	4·3898	− ·0001	596*a*
596*b*	67 20·6	67 22·2	− 1·6	1·8289	1·8300	− ·0011	4·3815	4·3898	− ·0083	596*b*
597	67 24·8	67 26·4	− 1·6	1·8263	1·8253	+ ·0010	4·3903	4·3936	− ·0033	597
598	69 40·4	69 43·5	− 3·1	1·6788	1·6789	− ·0001	4·5319	4·5446	− ·0127	598
599	69 39·7	69 35·2	+ 4·5	1·6832	1·6906	− ·0074	4·5410	4·5427	− ·0017	599
600	67 45·0	67 42·2	+ 2·8	1·7997	1·8019	− ·0022	4·3991	4·3942	+ ·0049	600
601	69 10·2	69 12·4	− 2·2	1·7111	1·7075	+ ·0036	4·4975	4·4965	+ ·0010	601
602	69 33·4	69 28·5	+ 4·9	1·6900	1·6943	− ·0043	4·5334	4·5255	+ ·0079	602
603	69 36·7	69 33·1	+ 3·6	1·6798	1·6878	− ·0080	4·5197	4·5267	− ·0070	603
604	69 1·1	68 59·5	+ 1·6	1·7235	1·7221	+ ·0014	4·4942	4·4844	+ ·0098	604
605	69 38·0	69 36·4	+ 1·6	1·6800	1·6864	− ·0064	4·5254	4·5362	− ·0108	605
606	67 19·4	67 16·2	+ 3·2	1·8302	1·8322	− ·0020	4·3803	4·3798	+ ·0005	606
607	68 45·6	68 46·9	− 1·3	1·7391	1·7362	+ ·0029	4·4743	4·4719	+ ·0024	607
608	68 23·8	68 27·2	− 3·4	1·7627	1·7600	+ ·0027	4·4513	4·4573	− ·0060	608
609	67 13·1	67 17·2	− 4·1	1·8381	1·8316	+ ·0065	4·3765	4·3757	+ ·0008	609
610	68 30·1	68 31·7	− 1·6	1·7444	1·7555	− ·0111	4·4288	4·4630	− ·0342	610
611	67 13·6	67 16·5	− 2·9	1·8393	1·8382	+ ·0011	4·3812	4·3890	− ·0078	611
612	69 52·8	69 53·3	− 0·5	1·6662	1·6698	− ·0036	4·5482	4·5601	− 0119	612
613	67 11·8	67 13·3	− 1·5	1·8361	1·8355	+ ·0006	4·3673	4·3711	− ·0038	613
614	69 15·2	69 11·9	+ 3·3	1·7092	1·7105	− ·0013	4·5103	4·5025	+ ·0078	614
615	68 29·7	68 27·0	+ 2·7	1·7566	1·7559	+ ·0007	4·4582	4·4462	+ 0120	615
616	67 12·6	67 14·9	− 2·3	1·8385	1·8331	+ ·0054	4·3757	4·3711	+ ·0046	616
617	67 10·0	67 13·1	− 3·1	1·8404	1·8389	+ ·0015	4·3710	4·3785	− ·0075	617
618	67 24·7	67 22·0	+ 2·7	1·8209	1·8258	− ·0049	4·3769	4·3790	− ·0021	618
619	69 10·9	69 7·4	+ 3·5	1·7156	1·7170	− ·0014	4·5120	4·5018	+ ·0102	619
620*a*	68 17·2	68 16·0	+ 1·2	1·7607	1·7674	− ·0067	4·4215	4·4337	− ·0122	620*a*
620*b*	68 12·5	68 16·0	− 3·5	1·7738	1·7674	+ ·0064	4·4367	4·4337	+ ·0030	620*b*
621	68 30·7	68 28·9	+ 1·8	1·7563	1·7525	+ ·0038	4 4613	4·4448	+ ·0165	621
622	68 29·7	68 31·7	− 2·0	1·7520	1·7540	− ·0020	4·4465	4·4592	− 0127	622
623	67 19·5	67 21·9	− 2·4	1·8318	1·8311	+ ·0007	4·3844	4·3913	− ·0069	623
624	68 15·4	68 13·8	+ 1·6	1·7657	1·7707	− ·0050	4·4273	4·4338	− ·0065	624
625	67 29·7	67 31·9	− 2·2	1·8167	1·8165	+ ·0002	4·3848	4·3923	− ·0075	625
626	69 32·8	69 29·2	+ 3·6	1 6868	1·6916	− ·0048	4·5227	4·5213	+ ·0014	626
627	68 37·5	68 37·5	0·0	1·7501	1·7480	+ ·0021	4·4715	4·4661	+ ·0054	627
628	69 27·7	69 25·5	+ 2·2	1·6936	1·6963	− ·0027	4·5205	4·5189	+ ·0016	628

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′		
629		Stonyhurst	R & T	90	53 50 40	2 28 10	19 2·8	19 11·2	− 8·4	629
630		Stratford-on-Avon	R	92	52 11 41	1 41 55	17 36·3	18 20·1	− 43·8	630
631		Strood	W	91	51 24 5	0 29 40E.	17 5·5	17 3·9	+ 1·6	631
632		Stroud	B	90	51 43 50	2 13 12	18 22·8	18 27·3	− 4·5	632
633		Sunderland	W	91	54 53 30	1 24 40	18 40·1	18 50·5	− 10·4	633
634	142	Sutton Bridge	R	88	52 45 40	0 11 50E	17 22·5	17 31·2	− 8·7	634
635		Sutton-on-Derwent	,,	89	53 54 53	0 55 25	18 33·9	18 21·9	+ 12·0	635
636		Swanley Junction	G	90	51 22 44	0 10 43E.	17 13·5	17 12·3	+ 1·2	636
637*a*	143	Swansea (*a*)	R	86	51 37 14	3 58 8	19 11·1	19 16·0	− 4·9	637*a*
637*b*		,, (*b*)	W	92	51 37 14	3 58 8	19 5·1	19 16·0	− 10·9	637*b*
638	144	Swindon	T	86	51 34 12	1 46 54	..	..	..	638
639		,,	W	92	51 33 10	1 47 50	17 42·3	18 11·5	− 29·2	639
640		Syston	G	92	52 42 16	1 4 50	17 44·0	18 9·5	− 25·5	640
641		Tamworth	R & T	90	52 37 52	1 42 1	18 36·2	18 27·1	+ 9·1	641
642	145	Taunton	T	86	51 0 52	3 5 32	18 37·2	18 38·2	− 1·0	642
643		Tavistock	G	90	50 31 13	4 7 16	19 1·0	18 57·4	+ 3·6	643
644		Terling (Witham)	,,	92	51 47 38	0 33 50E.	17 15·8	17 7·2	+ 8·6	644
645		Tetbury	W	92	51 39 3	2 10 17	18 24·3	18 24·3	0·0	645
646		Tewkesbury	R	92	51 59 24	2 10 0	18 35·0	18 30·3	+ 4·7	646
647	146	Thetford	,,	87	52 23 57	0 43 12E.	17 10·3	17 10·5	− 0·2	647
648	147	Thirsk	,,	86	54 14 35	1 20 38	18 48·1	18 40·2	+ 7·9	648
649		Thorne	,,	89	53 37 4	0 57 30	18 11·9	18 18·9	− 7·0	649
650	148	Tilney	,,	88	52 42 10	0 17 11E.	17 26·7	17 27·6	− 0·9	650
651	205	Tintern	T	89	51 42 0	2 40 0	..	..	..	651
652		Tiverton	G	90	50 55 24	3 28 55	18 55·8	18 47·6	+ 8·2	652
653		Towcester	R & T	90	52 7 55	0 59 28	18 11·9	17 57·6	+ 14·3	653
654		Tregaron	B	90	52 13 2	3 55 49	19 15·1	19 27·4	− 12·3	654
655		Tring	R & T	90	51 47 41	0 38 2	17 57·4	17 41·6	+ 15·8	655
656		Truro	G	90	50 15 22	5 2 15	19 22·6	19 17·0	+ 5·6	656
657*a*	149	Tunbridge Wells (*a*)	T	87	51 7 36	0 15 37E.	17 10·7	17 6·3	+ 4·4	657*a*
657*b*		,, ,, (*b*)	R	92	51 7 36	0 15 37E.	17 4·8	17 6·3	− 1·5	657*b*
658		Ullesthorpe	G	92	52 29 5	1 15 35	18 16·9	18 11·3	+ 5·6	658
659		Ulverston	W	92	54 12 15	3 6 10	19 26·2	19 37·5	− 11·3	659
660		Uttoxeter	G	92	52 53 55	1 52 43	18 40·5	18 37·4	+ 3·1	660
661		Ventnor	G	90	50 35 47	1 12 44	17 35·0	17 39·2	− 4·2	661
662		Wadebridge	G	90	50 30 50	4 51 12	19 18·4	19 18·0	+ 0·4	662
663		Wainfleet	R	89	53 6 35	0 13 56E.	17 34·6	17 34·6	0·0	663
664	150	Wallingford	T	88	51 36 3	1 7 21	17 49·5	17 52·8	− 3·3	664
665		Ware	G	90	51 48 43	0 1 30	17 30·5	17 24·3	+ 6·2	665
666		Watton	,,	92	52 34 2	0 50 15E.	17 15·4	17 9·0	+ 6·4	666
667		Wellington (Salop)	B	90	52 42 18	2 30 38	19 1·0	18 53·2	+ 7·8	667
668		Wells (Somerset)	G	90	51 12 55	2 38 55	18 26·5	18 30·0	− 3·5	668
669		Welshpool	B	90	52 40 2	3 9 3	19 19·5	19 12·5	+ 7·0	669
670		Wem	W	92	52 51 19	2 42 45	18 57·3	19 2·3	− 5·0	670
671		Westerham	B	90	51 15 30	0 4 12E.	17 16·9	17 13·4	+ 3·5	671
672		Weston-super-Mare	G	90	51 20 13	2 56 45	18 40·5	18 40·9	− 0·4	672
673		Wetherby	R	89	53 55 10	1 22 54	18 37·9	18 37·0	+ 0·9	673
674	151	Weymouth	T	87	50 36 16	2 26 52	18 14·0	18 12·6	+ 1·4	674
675	152	Wheelock	,,	87	53 7 50	2 22 30	..	..	..	675
676		Whitby	W	91	54 28 49	0 38 12	18 20·4	18 19·6	+ 0·8	676
677		Whitchurch (Hants.)	G	90	51 13 20	1 21 34	17 38·9	17 53·3	− 14·4	677
678		,, (Salop)	B	90	52 58 4	2 41 18	18 59·4	19 3·8	− 4·4	678
679	153	Whitehaven	R	86	54 32 37	3 34 20	20 6·0	19 59·0	+ 7·0	679
680*a*		Whitewell (*a*)	R & T	90	53 55 0	2 31 0	19 11·3	19 14·2	− 2·9	680*a*
680*b*		,, (*b*)	,,	90	53 55 0	2 31 0	19 5·6	19 14·2	− 8·6	680*b*

Vertical Forces, Observed and Calculated, with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Differenee.	Observed.	Calculated.	Difference.	
629	69° 9′·6	69° 10′·9	– 1′·3	1·7130	1·7123	+ ·0007	4·5001	4·5033	– ·0032	629
630	68 9·7	67 54·3	+ 15·4	1·7797	1·7824	– ·0027	4·4410	4·3907	+ ·0503	630
631	67 17·4	67 17·6	– 0·2	1·8333	1·8312	+ ·0021	4·3805	4·3763	+ ·0042	631
632	67 54·0	67 50·8	+ 3·2	1·7965	1·7991	– ·0026	4·4243	4·4190	+ ·0053	632
633	69 37·9	69 41·0	– 3·1	1·6830	1·6796	+ ·0034	4·5330	4·5365	– ·0035	633
634	68 15·3	68 13·0	+ 2·3	1·7715	1·7703	+ ·0012	4·4414	4·4299	+ ·0115	634
635	69 10·0	69 3·3	+ 6·7	1·7139	1·7178	– ·0039	4·5040	4·4879	+ ·0161	635
636	67 16·3	67 19·3	– 3·0	1·8355	1·8297	+ ·0058	4·3819	4·3788	+ ·0031	636
637*a*	67 52·9	67 59·3	– 6·4	1·8039	1·7932	+ ·0107	4·4383	4·4358	+ ·0025	637*a*
637*b*	67 53·3	67 59·3	– 6·0	1·8035	1·7932	+ ·0103	4·4389	4·4358	+ ·0031	637*b*
638	67 44·9	67 40·7	+ 4·2	1·8033	1·8094	– ·0061	4·4075	4·4070	+ ·0005	638
639	67 46·1	67 40·7	+ 5·4	1·8068	1·8094	– ·0026	4·4205	4·4070	+ ·0135	639
640	68 22·6	68 19·5	+ 3·1	1·7652	1·7653	– ·0001	4·4531	4·4417	+ ·0114	640
641	68 27·4	68 21·3	+ 6·1	1·7553	1·7643	– ·0090	4·4462	4·4459	+ ·0003	641
642	67 25·9	67 29·5	– 3·6	1·8262	1·8241	+ ·0021	4·3940	4·4020	– ·0080	642
643	67 12·3	67 17·3	– 5·0	1·8429	1·8388	+ ·0041	4·3852	4·3933	– ·0081	643
644	67 36·3	67 32·6	+ 3·7	1·8097	1·8141	– ·0044	4·3918	4·3890	+ ·0028	644
645	67 50·9	67 47·3	+ 3·6	1·8002	1·8029	– ·0027	4·4219	4·4153	+ ·0066	645
646	68 5·6	68 0·5	+ 5·1	1·7825	1·7883	– ·0058	4·4326	4·4280	+ ·0046	646
647	67 55·5	67 55·4	+ 0·1	1·7885	1·7886	– ·0001	4.4100	4·4099	+ ·0001	647
648	69 22·7	69 18·0	+ 4·7	1·7009	1·7032	– ·0023	4·5199	4·5074	+ ·0125	648
649	68 57·2	68 52·6	+ 4·6	1·7285	1·7292	– ·0007	4·4920	4·4760	+ ·0160	649
650	68 14·9	68 10·1	+ 4·8	1·7750	1·7733	+ ·0017	4·4487	4·4265	+ ·0222	650
651	67 54·9	67 53·1	+ 1·8	..	..	..	..	..	..	651
652	67 26·5	67 28·3	– 1·8	1·8259	1·8258	+ ·0001	4·3954	4·4017	– ·0063	652
653	68 3·1	67 57·4	+ 5·7	1·7828	1·7896	– ·0068	4·4241	4·4198	+ ·0043	653
654	68 21·7	68 21·9	– 0·2	1·7658	1·7685	– ·0027	4·4512	4·4588	– ·0076	654
655	67 46·8	67 41·5	+ 5·3	1·8019	1·8063	– ·0044	4·4110	4·4024	+ ·0086	655
656	67 13·1	69 13·8	– 0·7	1·8425	1·8439	– ·0014	4·3870	4·3929	– ·0059	656
657*a*	67 4·5	67 8·6	– 4·1	1·8397	1·8414	– ·0017	4·3499	4·3685	– ·0186	657*a*
657*b*	67 7·0	67 8·6	– 1·6	1·8397	1·8414	– ·0017	4·3588	4·3685	– ·0097	657*b*
658	68 16·4	68 12·6	+ 3·8	1·7655	1·7734	– ·0079	4·4306	4·4361	– ·0055	658
659	69 33·5	69 29·1	+ 4·4	1·6908	1·6957	– ·0049	4·5363	4·5318	+ ·0045	659
660	68 29·4	68 32·7	– 3·3	1·7547	1·7525	+ ·0022	4·4523	4·4592	– ·0069	660
661	66 58·2	66 58·2	0·0	1·8539	1·8545	– ·0006	4·3611	4·3627	– ·0016	661
662	67 16·6	67 22·2	– 5·6	1·8395	1·8343	+ ·0052	4·3929	4·4001	– ·0072	662
663	68 27·0	68 25·7	+ 1·3	1·7596	1·7559	+ ·0037	4·4555	4·4413	+ ·0142	663
664	67 42·1	67 37·9	+ 4·2	1·8087	1·8115	– ·0028	4·4105	4·4019	+ ·0086	664
665	67 40·7	67 37·7	+ 3·0	1·8079	1·8095	– ·0016	4·4034	4·3963	+ ·0071	665
666	68 5·7	68 0·9	+ 4·8	1·7794	1·7823	– ·0029	4·4253	4·4146	+ ·0107	666
667	68 30·2	68 29·6	+ 0·6	1·7623	1·7573	+ ·0050	4·4746	4·4596	+ ·0150	667
668	67 35·4	67 34·0	+ 1·4	1·8164	1·8183	– ·0019	4·4047	4·4043	+ ·0004	668
669	68 34·6	68 32·9	+ 1·7	1·7501	1·7548	– ·0047	4·4604	4·4658	– ·0054	669
670	68 38·7	68 37·0	+ 1·7	1·7406	1·7495	– ·0089	4·4518	4·4680	– ·0162	670
671	67 9·7	67 15·3	– 5·6	1·8391	1·8341	+ ·0050	4·3669	4·3755	– ·0086	671
672	67 40·9	67 40·9	0·0	1·8123	1·8113	+ ·0010	4·4148	4·4124	+ ·0024	672
673	69 7·4	69 6·4	+ 1·0	1·7184	1·7151	+ ·0033	4·5055	4·4929	+ ·0126	673
674	67 4·8	67 7·9	– 3·1	1·8439	1·8461	– ·0022	4·3609	4·3770	– ·0161	674
675	68 42·9	68 44·6	– 1·7	..	..	..	..	..	..	675
676	69 22·0	69 21·3	+ 0·7	1·7014	1·6984	+ ·0030	4·5078	4·4974	+ ·0104	676
677	67 20·7	67 24·3	– 3·6	1·8354	1·8265	+ ·0089	4·3974	4·3890	+ ·0084	677
678	68 35·7	68 41·0	– 5·3	1·7480	1·7450	+ ·0030	4·4592	4·4719	– ·0127	687
679	69 41·7	69 43·2	– 1·5	1·6829	1·6806	+ ·0023	4·5482	4·5481	+ ·0001	697
680*a*	..	..	..	1·7122	1·7089	+ ·0033	..	..	..	680*a*
680*b*	69 9·3	69 14·3	– 5·0	1·7112	1·7089	+ ·0023	4·4941	4·5078	– ·0137	680*b*

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

England and

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
681		Wickwar	W	92	51 36 2	2 24 2	18 19·1	18 38·5	− 19·4	681
682		Wigan	,,	91	53 32 49	2 39 46	19 5·7	19 12·5	− 6·8	682
683		Wigton	,,	92	54 49 33	3 9 46	19 47·3	19 49·2	− 1·9	683
684		Wimborne	G	90	50 47 40	1 58 55	18 0·1	18 3·3	− 3·2	684
685	154	Windsor	T	88	51 29 22	0 37 25	17 58·3	17 46·8	+ 11·5	685
686	155	Wisbech	R	88	52 40 30	0 8 20E.	17 34·1	17 31·9	+ 2·2	686
687		Woburn Sands	R & T	90	52 0 40	0 38 34	18 0·5	17 45·5	+ 15·0	687
688		Wolverhampton	G	92	52 36 5	2 8 8	18 18·2	18 40·3	− 22·1	688
689		Woodhead	,,	92	53 29 40	1 49 34	18 40·4	18 45·3	− 4·9	689
690		Wooler	W	91	55 33 0	2 1 5	19 22·9	19 19·8	+ 3·1	690
691		Worcester	R	92	52 10 20	2 12 50	18 39·1	18 34·8	+ 4·3	691
692		Worksop	G	92	53 17 52	1 7 42	18 17·3	18 20·0	− 2·7	692
693	156	Worthing	T	87	50 48 35	0 23 22	17 28·0	17 19·6	+ 8·4	693
694		Worthington	G	92	52 47 8	1 23 32	17 55·6	18 20·5	− 24·9	694
695		Wye	,,	90	51 10 45	0 56 30E.	16 41·8	16 47·8	− 6·0	695
696		Yarmouth (Great)	G	90	52 38 7	1 43 53E.	16 48·8	16 41·7	+ 7·1	696

Ireland.

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Observed.	Calculated.	Difference.	No. 1891.
697		Annalong	W	92	54 6 40	5 54 0	21 18·4	21 8·2	+ 10·2	697
698*a*	157	Armagh (*a*)	T	87	54 21 10	6 38 53	21 38·3	21 38·1	+ 0·2	698*a*
698*b*		,, (*b*)	W	92	54 21 10	6 38 53	21 35·4	21 38·1	− 2·7	698*b*
699		Athboy	G	91	53 38 13	6 53 40	21 33·6	21 29·5	+ 4·1	699
700		Athenry	,,	91	53 18 15	8 44 54	22 25·2	22 21·9	+ 3·3	700
701	158	Athlone	T	87	53 26 8	7 57 22	21 47·9	22 0·2	− 12·3	701
702	159	Bagnalstown	R	87	52 41 37	6 57 36	21 17·4	21 10·8	+ 6·6	702
703		Ballaghaderreen	G	91	53 53 57	8 35 16	22 31·6	22 31·8	− 0·2	703
704	160	Ballina	R	87	54 7 10	9 9 0	22 46·8	22 55·8	− 9·0	704
705		Ballinahinch	G	91	53 27 10	9 52 6	22 45·5	23 1·6	− 16·1	705
706		Ballinalee	,,	91	53 45 20	7 39 16	21 57·4	21 57·4	0·0	706
707		Ballinamore	,,	91	54 3 8	7 48 29	22 5·0	22 10·0	− 5·0	707
708		Ballinasloe	,,	91	53 19 50	8 14 30	22 6·4	22 6·3	+ 0·1	708
709		Ballybrophy Junction	W	92	52 54 8	7 36 24	21 38·7	21 35·8	+ 2·9	709
710		Ballybunnion	G	91	52 30 48	9 40 10	22 35·0	22 29·2	+ 5·8	710
711*a*		Ballycastle, Antrim (*a*)	,,	91	55 11 22	6 12 5	21 58·4	21 39·5	+ 18·9	711*a*
711*b*		,, ,, ,, (*b*)	,,	91	55 11 22	6 12 5	21 57·8	21 39·5	+ 18·3	711*b*
712		Ballycastle (Mayo)	,,	91	54 16 42	9 22 17	22 56·6	23 6·8	− 10·2	712
713		Ballygalley Bay	W	92	54 54 0	5 51 50	21 22·7	21 22·3	+ 0·4	713
714*a*		Ballymena (*a*)	G	91	54 53 2	6 13 36	21 13·5	21 34·6	− 21·1	714*a*
714*b*		,, (*b*)	,,	91	54 53 2	6 13 36	21 27·3	21 34·6	− 7·3	714*b*
715		South of Ballymena (1)	W	92	54 48 12	6 17 0	22 29·1	21 34·7	+ 54·4	715
716		,, ,, (2)	,,	92	54 48 40	6 16 35	18 52·8	21 34·9	−162·1	716
717		North ,, (1)	,,	92	54 56 6	6 16 50	21 35·0	21 37·5	− 2·5	717
718		,, ,, (2)	,,	92	54 55 28	6 15 48	22 38·1	21 36·4	+ 1·7	718
719		Ballymoney	,,	92	55 4 0	6 31 30	21 20·0	21 48·2	− 28·2	719
720		Ballymote	G	91	54 5 16	8 31 27	22 29·7	22 34·2	− 4·5	720
721		Ballyragget	W	92	52 47 32	7 19 22	21 24·7	21 24·2	+ 0·5	721
722		Ballyshannon	G	91	54 30 5	8 10 41	22 45·1	22 32·3	+ 12·8	722
723	161	Ballywilliam	R	87	52 26 37	6 52 0	21 0·0	21 1·8	− 1·8	723
724		Baltinglass	G	91	52 57 8	6 42 26	21 14·8	21 9·0	+ 5·8	724
725		Bandon	W	92	51 45 12	8 44 15	21 45·8	21 39·5	+ 6·3	725
726	162	Bangor	T	87	54 39 57	5 39 50	21 8·8	21 13·3	− 4·5	726
727		Bannow	G	91	52 13 16	6 45 52	20 43·8	20 52·8	− 9·0	727
728*a*	163	Bantry (*a*)	R	87	51 40 25	9 28 53	22 1·1	21 59·5	+ 1·6	728*a*
728*b*		,, (*b*)	W	92	51 40 20	9 28 45	22 0·8	21 59·5	+ 1·3	728*b*
729		Belfast	G	91	54 35 5	5 56 0	21 28·1	21 18·5	+ 9·6	729

Vertical Forces, Observed and Calculated with Differences (continued).

Wales (continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
681	67° 49′·2	67° 49′·2	0′·0	1·8005	1·8017	− ·0012	4·4163	4·4193	− ·0030	681
682	69 5·8	69 1·9	+ 3·9	1·7229	1·7226	+ ·0003	4·5110	4·4949	+ ·0161	682
683	69 50·7	69 50·4	+ 0·3	1·6698	1·6725	− ·0027	4·5494	4·5556	− ·0062	683
684	67 10·3	67 11·9	− 1·6	1·8401	1·8410	− ·0009	4·3715	4·3792	− ·0077	684
685	67 32·5	67 29·9	+ 2·6	1·8184	1·8195	− ·0011	4·3991	4·3923	+ ·0068	685
686	68 13·1	68 10·0	+ 3·1	1·7748	1·7736	+ ·0012	4·4415	4·4269	+ ·0146	686
687	67 57·8	67 50·3	+ 7·5	1·7916	1·7968	− ·0052	4·4262	4·4113	+ ·0149	687
688	68 27·6	68 23·3	+ 4·3	1·7531	1·7634	− ·0103	4·4414	4·4511	− ·0097	688
689	68 58·2	68 53·9	+ 4·3	1·7292	1·7295	− ·0003	4·4978	4·4817	+ ·0161	689
690	70 5·9	70 7·8	− 1·9	1·6568	1·6527	+ ·0041	4·5765	4·5730	+ ·0035	690
691	68 11·5	68 7·6	+ 3·9	1·7721	1·7806	− ·0085	4·4297	4·4354	− ·0057	691
692	68 43·8	68 42·2	+ 1·6	1·7402	1·7408	− ·0006	4·4703	4·4657	+ ·0046	692
693	66 59·9	67 0·9	− 1·0	1·8505	1·8511	− ·0006	4·3591	4·3641	− ·0050	693
694	68 19·1	68 25·1	− 6·0	1·7691	1·7599	+ ·0092	4·4497	4·4492	+ ·0005	694
695	67 3·6	67 5·6	− 2·0	1·8434	1·8438	− ·0004	4·3555	4·3635	− ·0080	695
696	67 57·6	67 53·2	+ 4·4	1·7873	1·7883	− ·0010	4·4158	4·4011	+ ·0147	696
697	69 39·9	69 43·9	− 4·0	1·6928	1·6835	+ ·0093	4·5677	4·5588	+ ·0089	697
698*a*	69 51·2	69 56·4	− 5·2	1·6734	1·6711	+ ·0023	4·5625	4·5764	− ·0139	698*a*
698*b*	69 52·4	69 56·4	− 4·0	1·6760	1·6711	+ ·0049	4·5733	4·5764	− ·0031	698*b*
699	69 29·1	69 33·6	− 4·5	1·7054	1·6960	+ ·0094	4·5576	4·5506	+ ·0070	699
700	69 36·7	69 33·9	+ 2·8	1·6959	1·6989	− ·0030	4·5630	4·5596	+ ·0034	700
701	69 33·0	69 33·3	− 0·3	1·6967	1·6979	− ·0012	4·5502	4·5545	− ·0043	701
702	68 58·1	69 0·2	− 2·1	1·7321	1·7323	− ·0002	4·5049	4·5136	− ·0087	702
703	70 4·6	69 53·7	+ 10·9	1·6670	1·6772	− ·0102	4·5992	4·5818	+ ·0174	703
704	70 18·7	70 4·8	+ 13·9	1·6439	1·6657	− ·0218	4·5941	4·5964	− ·0023	704
705	69 52·8	69 46·2	+ 6·6	1·6719	1·6869	− ·0150	4·5637	4·5775	− ·0138	705
706	69 45·4	69 42·5	+ 2·9	1·6769	1·6880	− ·0111	4·5471	4·5653	− ·0182	706
707	69 55·1	69 53·8	+ 1·3	1·6736	1·6762	− ·0026	4·5779	4·5796	− ·0017	707
708	69 28·7	69 31·7	− 3·0	1·7006	1·7003	+ ·0003	4·5432	4·5545	− ·0113	708
709	69 6·2	69 12·2	− 6·0	1·7284	1·7202	+ ·0082	4·5270	4·5293	− ·0023	709
710	69 11·3	69 12·0	− 0·7	1·7245	1·7243	+ ·0002	4·5369	4·5392	− ·0023	710
711*a*	70 22·7	70 22·3	+ 0·4	1·6426	1·6429	− ·0003	4·6074	4·6066	+ ·0008	711*a*
711*b*	..	..	..	1·6460	1·6429	+ ·0031	..	..	..	711*b*
712	70 10·1	70 11·7	− 1·6	1·6499	1·6590	− ·0091	4·5748	4·6068	− ·0320	712
713	70 12·8	70 10·4	+ 2·4	1·6517	1·6554	− ·0037	4·5911	4·5913	− ·0002	713
714*a*	70 8·2	70 12·2	− 4·0	1·6563	1·6540	+ ·0023	4·5847	4·5950	− ·0103	714*a*
714*b*	..	..	..	1·6725	1·6540	+ ·0185	..	..	..	714*b*
715	69 40·5	70 9·6	− 29·1	1·6792	1·6567	+ ·0225	4·5334	4·5916	− ·0582	715
716	69 58·3	70 10·0	− 11·7	1·6456	1·6564	− ·0108	4·5143	4·5925	− ·0782	716
717	70 34·6	70 14·4	+ 20·2	1·6115	1·6516	− ·0401	4·5701	4·5975	− ·0274	717
718	71 9·6	70 13·6	+ 56·0	1·6104	1·6524	− ·0420	4·7197	4·5964	+ ·1233	718
719	69 56·9	70 20·3	− 23·4	1·6685	1·6455	+ ·0230	4·5714	4·6054	− ·0340	719
720	70 3·4	69 59·8	+ 3·6	1·6633	1·6706	− ·0073	4·5840	4·5890	− ·0050	720
721	69 1·4	69 6·2	− 4·8	1·7303	1·7265	+ ·0038	4·5130	4·5221	− ·0091	721
722	70 10·5	70 11·5	− 1·0	1·6507	1·6574	− ·0067	4·5788	4·6015	− ·0227	722
723	68 58·5	68 50·5	+ 8·0	1·7335	1·7428	− ·0093	4·5100	4·5030	+ ·0070	723
724	69 2·0	69 7·9	− 5·9	1·7264	1·7235	+ ·0029	4·5053	4·5208	− ·0155	724
725	68 36·9	68 38·0	− 1·1	1·7590	1·7595	− ·0005	4·4919	4·4974	− ·0055	725
726	69 55·1	70 1·2	− 6·1	1·6705	1·6646	+ ·0059	4·5694	4·5784	− ·0090	726
727	68 44·7	68 41·7	+ 3·0	1·7460	1·7522	− ·0062	4·4887	4·4929	− ·0042	727
728*a*	68 38·0	68 40·0	− 2·0	1·7639	1·7586	+ ·0053	4·5086	4·5029	+ ·0057	728*a*
728*b*	68 35·3	68 40·0	− 4·7	1·7642	1·7586	+ ·0056	4·4990	4·5029	− ·0039	728*b*
729	69 46·6	69 59·8	− 13·2	1·6759	1·6666	+ ·0093	4·5493	4·5780	− ·0287	729

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

Ireland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
					° ′ ″	° ′ ″	° ′	° ′	′	
730		Belmullet	G	91	54 13 12	9 59 15	23 38·7	23 26·0	+ 12·7	730
731		Bray	,,	91	53 12 5	6 6 55	20 53·0	20 56·1	− 3·1	731
732		Broadway	,,	91	52 13 23	6 23 38	20 44·0	20 41·3	+ 2·7	732
733		Buncrana	,,	91	55 8 34	7 27 20	22 10·4	22 22·0	− 11·6	733
734		Burncourt	W	92	52 19 11	8 5 57	21 36·3	21 36·0	+ 0·3	734
735		Carlow	G	91	52 49 52	6 53 37	21 18·0	21 11·7	+ 6·3	735
736		Carnlough	W	92	54 59 10	5 59 32	21 30·4	21 28·6	+ 1·8	736
737		Carrickfergus	,,	92	54 43 47	5 46 2	21 49·4	21 16·0	+ 33·4	737
738*a*	164	Carrick-on-Shannon (*a*)	T	87	53 56 36	8 5 46	22 23·9	22 17·0	+ 6·9	738*a*
738*b*		,, ,, (*b*)	W	92	53 56 36	8 5 46	22 22·0	22 17·0	+ 5·0	738*b*
739		Castlebellingham	,,	92	53 54 7	6 24 48	21 35·2	21 20·8	+ 14·4	739
740		Castleblaney	G	91	54 7 37	6 44 55	21 38·6	21 36·7	+ 1·9	740
741		Castlecomer	W	92	52 48 23	7 13 10	21 27·5	21 21·5	+ 6·0	741
742	165	Castlereagh	T	87	53 45 34	8 29 7	22 31·6	22 24·8	+ 6·8	742
743		Castletown (Berehaven)	G	91	51 39 15	9 54 16	22 17·2	22 11·0	+ 6·2	743
744	166	Cavan	R	87	53 59 4	7 21 43	21 59·2	21 53·8	+ 5·4	744
745*a*	167	Charleville (*a*)	,,	87	52 20 54	8 40 22	21 51·9	21 54·3	− 2·4	745*a*
745*b*		,, (*b*)	W	92	52 20 54	8 40 22	21 56·9	21 54·3	+ 2·6	745*b*
746		Churchtown	G	91	51 49 30	8 4 28	21 26·9	21 22·0	+ 4·9	746
747	168	Clifden	R	87	53 29 35	10 4 10	23 40·1	23 9·4	+ 30·7	747
748		Clonakilty	W	92	51 37 12	8 53 32	21 43·2	21 40·4	+ 2·8	748
749		Clones	G	91	54 10 49	7 12 40	21 59·7	21 52·9	+ 6·8	749
750		Clonmel	,,	91	52 21 13	7 43 56	21 27·4	21 25·5	+ 1·9	750
751	169	Coleraine	T	87	55 7 31	6 40 24	21 58·2	21 54·7	+ 3·5	751
752		Cong	G	91	53 32 37	9 17 12	23 3·5	22 45·4	+ 18·1	752
753	170	Cookstown Junction	T	87	54 44 56	6 16 1	20 54·8	21 33·6	− 38·8	753
754	171	Cork	R	87	51 53 30	8 29 30	21 39·6	21 36·3	+ 3·3	754
755		Cromwell's Hill (1)	G	91	52 29 58	8 23 35	21 36·5	21 49·4	− 12·9	755
756		,, ,, (2)	,,	91	52 29 58	8 23 35	21 40·2	21 49·4	− 9·2	756
757		,, ,, (3)	,,	91	52 29 45	8 23 35	21 41·9	21 49·4	− 7·5	757
758		,, ,, (4)	,,	91	52 30 3	8 24 2	21 33·4	21 49·4	− 16·0	758
759		,, ,, (5)	,,	91	52 30 3	8 24 20	21 40·1	21 49·4	− 9·3	759
760		Culdaff	W	92	55 17 5	7 8 11	22 10·8	22 13·6	− 2·8	760
761	172	Donegal	T	87	54 39 5	8 6 57	22 40·5	22 33·7	+ 6·8	761
762		Doneraile	W	92	52 13 38	8 35 1	21 40·4	21 48·5	− 8·1	762
763		Downpatrick	G	91	54 19 15	5 43 15	21 0·7	21 6·6	− 5·9	763
764		Draperstown	,,	91	54 47 40	6 47 22	21 57·6	21 52·0	+ 5·6	764
765	173	Drogheda	T	87	53 42 48	6 22 4	21 17·1	21 15·5	+ 1·6	765
766		Dromore	W	92	54 24 47	6 5 50	21 15·5	21 20·8	− 5·3	766
767		Drumsurn	,,	92	54 59 34	6 52 24	21 56·1	21 58·6	− 2·5	767
768	174	Dublin (Trinity College)	T	87	53 20 35	6 15 24	21 3·5	21 3·9	− 0·4	768
769		Dundalk	G	91	53 59 38	6 23 30	21 26·8	21 22·1	+ 4·7	769
770		Dundrum	,,	91	54 15 17	5 51 3	21 10·8	21 9·4	+ 1·4	770
771		Dungannon	,,	91	54 30 38	6 46 48	21 34·8	21 45·4	− 10·6	771
772		Dungarvan	,,	91	52 5 27	7 38 4	21 18·1	21 15·8	+ 2·3	772
773		Dungiven	,,	91	54 55 42	6 54 10	21 55·4	21 58·4	− 3·0	773
774		Dunkineely	,,	91	54 37 46	8 22 15	22 47·1	22 42·0	+ 5·1	774
775		Dunleer	W	92	53 47 58	6 23 10	21 22·2	21 18·0	+ 4·2	775
776		Dunloy (1)	,,	92	55 1 4	6 23 32	23 7·1	21 42·8	+ 84·3	776
777		,, (2)	,,	92	55 1 5	6 22 30	20 46·0	21 42·1	− 56·1	777
778		Dunmanway	,,	92	51 42 49	9 6 37	21 49·8	21 49·7	+ 0·1	778
779		Eglington	,,	92	55 2 5	7 10 55	22 6·8	22 10·1	− 3·3	779
780		Ennis	G	91	52 50 15	8 59 0	22 9·5	22 16·9	− 7·4	780
781		Enniscorthy (1)	,,	91	52 31 12	6 36 50	20 56·5	20 55·2	+ 1·3	781
782		,, (2)	,,	91	52 30 14	6 30 12	20 56·1	20 51·2	+ 4·9	782
783*a*	175*a*	Enniskillen (*a*)	T	87	54 21 18	7 39 50	..	..	..	783*a*
783*b*	175*b*	,, (*b*)	R	87	54 21 7	7 39 8	22 26·3	22 11·5	+ 14·8	783*b*
783*c*		,,	W	92	54 21 7	7 39 8	22 22·4	22 11·5	+ 10·9	783*c*

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
730	70° 17′·9	70° 13′·6	+ 4′·3	1·6502	1·6578	− ·0076	4·6083	4·6114	− ·0031	730
731	69 8·2	69 13·0	− 4·8	1·7184	1·7169	+ ·0015	4·5087	4·5238	− ·0151	731
732	68 39·4	68 39·0	+ 0·4	1·7574	1·7544	+ ·0030	4·4975	4·4883	+ ·0092	732
733	70 24·9	70 28·4	− 3·5	1·6409	1·6377	+ ·0032	4·6120	4·6179	− ·0059	733
734	68 51·3	68 54·6	− 3·3	1·7417	1·7407	+ ·0010	4·5031	4·5135	− ·0104	734
735	68 59·6	69 4·9	− 5·3	1·7326	1·7270	+ ·0056	4·5120	4·5181	− ·0061	735
736	70 17·8	70 14·3	+ 3·5	1·6473	1·6514	− ·0041	4·5998	4·5965	+ ·0033	736
737	69 57·1	70 4·0	− 6·9	1·6709	1·6620	+ ·0089	4·5788	4·5829	− ·0041	737
738*a*	69 46·5	69 51·9	− 5·4	1·6814	1·6784	+ ·0030	4·5638	4·5778	− ·0140	738*a*
738*b*	69 51·0	69 51·9	− 0·9	1·6793	1·6784	+ ·0009	4·5766	4·5778	− ·0012	738*b*
739	69 39·9	69 39·4	+ 0·5	1·6901	1·6889	+ ·0012	4·5604	4·5551	+ ·0053	739
740	69 58·1	69 49·7	+ 8·4	1·6652	1·6788	− ·0136	4·5672	4·5698	− ·0026	740
741	69 1·7	69 6·2	− 4·5	1·7324	1·7262	+ ·0062	4·5198	4·5213	− ·0015	741
742	69 49·3	69 48·2	+ 1·1	1·6831	1·6826	+ ·0005	4·5799	4·5740	+ ·0059	742
743	68 38·3	68 42·3	− 4·0	1·7595	1·7574	+ ·0021	4·4985	4·5086	− ·0101	743
744	69 50·6	69 48·6	+ 2·0	1·6741	1·6803	− ·0062	4·5607	4·5694	− ·0087	744
745*a*	68 57·7	68 59·4	− 1·7	1·7344	1·7363	+ ·0019	4·5093	4·5209	− ·0116	745*a*
745*b*	68 56·3	68 59·4	− 3·1	1·7371	1·7363	+ ·0008	4·5107	4·5209	− ·0102	745*b*
746	68 33·9	68 36·0	− 2·1	1·7626	1·7610	+ ·0016	4·4895	4·4936	− ·0041	746
747	69 57·2	69 49·2	+ 8·0	1·6751	1·6844	− ·0093	4·5907	4·5831	+ ·0076	747
748	68 32·4	68 34·2	− 1·8	1·7662	1·7638	+ ·0024	4·4927	4·4938	− ·0011	748
749	69 50·3	69 54·3	− 4·0	1·6738	1·6744	− ·0006	4·5588	4·5768	− ·0180	749
750	68 51·1	68 53·0	− 1·9	1·7409	1·7420	− ·0011	4·5003	4·5107	− ·0104	750
751	70 41·4	70 23·1	+ 18·3	1·6194	1·6423	− ·0229	4·6217	4·6083	+ ·0134	751
752	69 50·1	69 45·7	+ 4·4	1·6837	1·6867	− ·0030	4·5848	4·5749	+ ·0099	752
753	69 28·3	70 7·9	− 39·6	1·6939	1·6587	+ ·0352	4·5238	4·5901	− ·0663	753
754	68 38·8	68 41·6	− 2·8	1·7624	1·7558	+ ·0066	4·5079	4·5018	+ ·0061	754
755	69 1·8	69 2·8	− 1·0	1·7320	1·7319	+ ·0001	4·5191	4·5227	− ·0036	755
756	69 0·9	69 2·8	− 1·9	1·7348	1·7319	+ ·0029	4·5228	4·5227	+ ·0001	756
757	68 58·9	69 2·8	− 3·9	1·7400	1·7319	+ ·0081	4·5286	4·5227	+ ·0059	757
758	69 1·0	69 2.8	− 1·8	1·7326	1·7319	+ ·0007	4·5175	4·5227	− ·0052	758
759	68 57·6	69. 2·8	− 5·2	1·7351	1·7319	+ ·0032	4·5107	4·5227	− ·0120	759
760	70 22·3	70 31·2	− 8·9	1·6473	1·6344	+ ·0129	4·6189	4·6205	− ·0016	760
761	70 8·7	70 16·0	− 7·3	1·6562	1·6520	+ ·0042	4·5864	4·6054	− ·0190	761
762	68 52·3	68 54·4	− 2·1	1·7409	1·7418	− ·0009	4·5050	4·5155	− ·0105	762
763	69 47·8	69 49·4	− 1·6	1·6755	1·6773	− ·0018	4·5530	4·5646	− ·0116	763
764	70 9·3	70 12·3	− 3·0	1·6562	1·6539	+ ·0023	4·5889	4·5952	− ·0063	764
765	69 29·8	69 32·8	− 3·0	1·7005	1·6961	+ ·0044	4·5474	4·5477	− ·0003	765
766	69 31·3	69 55·0	− 23·7	1·6866	1·6720	+ ·0146	4·5162	4·5731	− ·0569	766
767	70 20·9	70 19·9	+ 1·0	1·6423	1·6465	− ·0042	4·5990	4·6065	− ·0075	767
768	69 9·0	69 18·9	− 9·9	1·7197	1·7092	+ ·0105	4·5152	4·5268	− ·0116	768
769	69 38·2	69 42·5	− 4·3	1·6909	1·6857	+ ·0052	4·5555	4·5591	− ·0036	769
770	69 47·0	69 48·0	− 1·0	1·6754	1·6791	− ·0037	4·5494	4·5637	− ·0143	770
771	70 4·0	70 3·1	+ 0·9	1·6675	1·6646	+ ·0029	4·5981	4·5863	+ ·0118	771
772	68 39·7	68 42·8	− 3·1	1·7518	1·7528	− ·0010	4·4843	4·4987	− ·0144	772
773	70 19·7	70 17·9	+ 1·8	1·6444	1·6485	− ·0041	4·5998	4·6036	− ·0038	773
774	70 16·9	70 17·1	− 0·2	1·6511	1·6515	− ·0004	4·6068	4·6087	− ·0019	774
775	69 36·7	69 35·7	+ 1·0	1·6952	1·6929	+ ·0023	4·5610	4·5508	+ ·0102	775
776	69 54·6	70 17·7	− 23·1	1·6842	1·6481	+ ·0361	4·6047	4·6016	+ ·0031	776
777	70 23·0	70 17·6	+ 5·4	1·6323	1·6182	− ·0159	4·5798	4·6015	− ·0217	777
778	68 37·6	68 39·0	− 1·4	1·7625	1·7590	+ ·0035	4·5035	4·5001	+ ·0034	778
779	70 21·6	70 23·2	− 1·6	1·6428	1·6433	− ·0005	4·6033	4·6116	− ·0083	779
780	69 11·8	69 19·2	− 7·4	1·7216	1·7149	+ ·0067	4·5313	4·5432	− ·0119	780
781	68 59·2	68 51·6	+ 7·6	1·7284	1·7412	− ·0128	4·4995	4·5031	− ·0036	781
782	68 54·5	68 50·1	+ 4·4	1·7326	1·7427	− ·0101	4·4921	4·5011	− ·0090	782
783*a*	70 7·9	70 3·0	+ 4·9	1·6602	1·6657	− ·0055	4·5942	4·5889	+ ·0053	783*a*
783*b*	70 7·2	70 3·0	+ 4·2	1·6578	1·6657	− ·0079	4·5846	4·5889	− ·0043	783*b*
783*c*	70 7·7	70 3·0	+ 4·7	1·6599	1·6657	− ·0058	4·5925	4·5888	+ ·0037	783*c*

TABLE XXIV.—Summary of Declinations, Inclinations, Horizontal and

Ireland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
784		Fermoy	W	92	52° 8′ 55″	8° 16′ 48″	21° 36′·8	21° 35′·9	+ 0′·9	784
785*a*	176*a*	Galway (*a*)	R	87	53 16 37	9 3 42	23 26·7	22 31·7	+ 55·0	785*a*
785*b*	176*b*	,, (*b*)	,,	87	53 17 30	9 3 21	22 50·2	22 31·8	+ 18·4	785*b*
786		Glencar Hotel	G	91	52 0 28	9 51 33	22 23·3	22 20·8	+ 2·5	786
787		Glenfarne	,,	91	54 16 58	7 59 14	22 28·3	22 21·1	+ 7·2	787
788		Glenmore (New Ross)	,,	91	52 21 6	7 1 30	20 55·2	21 3·8	− 8·6	788
789		Goragh Wood	W	92	54 15 27	6 22 8	21 34·5	21 26·7	+ 7·8	789
790		Gorey	G	91	52 40 22	6 17 50	20 49·3	20 49·6	− 0·3	790
791	177	Gort	R	87	53 4 20	8 49 15	22 11·1	22 18·6	− 7·5	791
792		Gortin	W	92	54 43 32	7 13 32	21 45·0	22 5·7	− 20·7	792
793	178	Greenore	T	87	54 1 35	6 7 47	21 37·0	21 14·4	+ 22·6	793
794		Gweedore	G	91	55 2 57	8 13 20	22 47·8	22 46·4	+ 1·4	794
795		Inishowen Head	W	92	55 14 2	6 55 40	22 6·3	22 5·2	+ 1·1	795
796		Inniskeen	,,	92	54 0 23	6 34 26	21 31·8	21 28·3	+ 3·5	796
797	179	Kells	T	87	53 43 8	6 52 46	21 29·0	21 32·2	− 3·2	797
798	180	Kildare	,,	87	53 9 25	6 54 30	21 22·6	21 20·5	+ 2·1	798
799		Kilfree Junction	W	92	53 59 32	8 26 8	22 35·1	22 29·3	+ 5·8	799
800		Kilkeel	,,	92	54 3 43	6 0 40	21 29·4	21 11·0	+ 18·4	800
801	181	Kilkenny	T	87	52 38 41	7 15 30	21 20·9	21 18·8	+ 2·1	801
802*a*	182	Killarney (*a*)	R	87	52 3 50	9 32 20	22 16·4	22 12·6	+ 3·8	802*a*
802*b*		,, (*b*)	W	92	52 3 48	9 32 23	22 17·9	22 12·6	+ 5·3	802*b*
803		Killenaule	,,	92	52 34 23	7 42 45	21 36·1	21 30·5	+ 5·6	803
804		Kilrea	G	91	54 56 13	6 34 3	22 34·5	21 47·3	− 12·8	804
805	183	Kilrush	R	87	52 37 56	9 29 40	22 31·7	22 27·4	+ 4·3	805
806		Kilteely (1)	G	91	52 31 55	8 24 10	23 52·4	21 50·9	+ 1·5	806
807		,, (2)	,,	91	52 31 40	8 24 7	21 47·3	21 50·9	− 3·6	807
808		,, (3)	,,	91	52 32 26	8 24 10	21 12·2	21 51·2	− 39·0	808
809		,, (4)	,,	91	52 32 26	8 24 10	22 5·1	21 51·2	+ 13·9	809
810		,, (5)	,,	91	52 32 38	8 23 58	21 39·8	21 51·2	− 11·4	810
811		Kingscourt	,,	91	53 54 30	6 48 41	21 32·6	21 33·9	− 1·3	811
812		Kinsale	,,	91	51 42 26	8 30 48	21 41·3	21 31·7	+ 9·6	812
813		Knocklong	W	92	52 26 17	8 24 50	21 42·7	21 48·4	− 5·7	813
814*a*		Larne (*a*)	G	91	54 51 42	5 48 31	21 27·2	21 19·8	+ 7·4	814*a*
814*b*		,, (*b*)	,,	91	54 51 42	5 48 31	21 26·6	21 19·8	+ 6·8	814*b*
815	184	Leenane	R	87	53 35 43	9 42 28	22 55·9	23 0·7	− 4·8	815
816		Letterkenny	G	91	54 56 55	7 43 55	22 24·1	22 27·2	− 3·1	816
817	185	Limerick	R	87	52 39 13	8 38 46	21 57·6	22 2·0	− 4·4	817
818		Lisburn	G	91	54 31 3	6 2 23	21 42·4	21 21·1	+ 21·3	818
819	186	Lisdoonvarna	R	87	53 1 47	9 17 34	22 18·8	22 32·2	− 13·4	819
820	187	Lismore	,,	87	52 8 15	7 55 12	21 27·5	21 25·9	+ 1·6	820
821		Little Saltee Island	G	91	52 8 18	6 35 2	20 18·4	20 45·4	− 27·0	821
822	188	Londonderry	T	87	55 1 24	7 18 6	22 11·4	22 13·9	− 2·5	822
823		Loughrea	G	91	53 12 6	8 32 32	22 26·5	22 12·8	+ 13·7	823
824		Louisburgh	,,	91	53 45 48	9 48 38	22 50·0	23 8·0	− 18·0	824
825		Lurgan	W	92	54 25 6	6 17 7	21 33·5	21 27·2	+ 6·3	825
826		Macroom	G	91	51 53 32	8 56 44	21 57·4	21 50·0	+ 7·4	826
827		Malahide	,,	91	53 27 0	6 8 35	21 0·2	21 2·1	− 1·9	827
828		Mallow	,,	91	52 8 6	8 40 10	21 56·3	21 48·2	+ 8·1	828
829		Manulla Junction	,,	91	53 49 30	9 11 33	22 49·2	22 49·4	− 0·2	829
830		Maum Bridge	,,	91	53 30 27	9 33 45	22 38·4	22 52·8	− 14·4	830
831		Maynooth	,,	91	53 22 41	6 36 2	21 13·3	21 15·6	− 2·3	831
832*a*		Midleton (*a*)	,,	91	51 54 58	8 9 50	21 25·5	21 27·2	− 1·7	832*a*
832*b*		,, (*b*)	,,	91	51 54 58	8 9 50	21 28·9	21 27·2	+ 1·7	832*b*
833		Miltown Malbay	,,	91	52 50 43	9 26 18	22 21·8	22 31·8	− 10·0	833
834		Mitchelstown	,,	91	52 15 36	8 16 0	21 39·6	21 39·6	0·0	834
835		Molranny	,,	91	53 54 5	9 41 17	23 2·1	23 7·9	− 5·8	835

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
784	68° 48′·1	68° 49′·6	− 1′·5	1·7466	1·7467	− ·0001	4·5034	4·5095	− ·0061	784
785*a*	69 45·6	69 35·1	+ 10·5	1·6700	1·6973	− ·0273	4·5292	4·5603	− ·0311	785*a*
785*b*	69 34·2	69 35·6	− 1·4	1·6984	1·6973	+ ·0011	4·5596	4·5622	− ·0026	785*b*
786	68 51·5	68 55·4	− 3·9	1·7492	1·7432	+ ·0060	4·5233	4·5231	+ ·0002	786
787	70 6·7	70 3·0	+ 3·7	1·6642	1·6665	− ·0023	4·6001	4·5911	+ ·0090	787
788	68 52·0	68 48·1	+ 3·9	1·7346	1·7457	− ·0111	4·4876	4·5011	− ·0135	788
789	69 57·0	69 50·8	+ 6·2	1·6696	1·6760	− ·0064	4·5748	4·5667	+ ·0081	789
790	68 58·0	68 54·9	+ 3·1	1·7266	1·7369	− ·0103	4·4901	4·5047	− ·0146	790
791	69 24·4	69 26·4	− 2·0	1·7130	1·7072	+ ·0058	4·5586	4·5516	+ ·0070	791
792	70 15·7	70 13·2	+ 2·5	1·6513	1·6540	− ·0027	4·6022	4·5993	+ ·0029	792
793	69 35·8	69 42·2	− 6·4	1·6942	1·6866	+ ·0076	4·5547	4·5603	− ·0056	793
794	70 30·4	70 30·5	− 0·1	1·6375	1·6367	+ ·0008	4·6259	4·6240	+ ·0019	794
795	70 23·9	70 28·2	− 4·3	1·6397	1·6373	+ ·0024	4·6044	4·6159	− ·0115	795
796	69 50·9	69 44·4	+ 6·5	1·6778	1·6841	− ·0063	4·5720	4·5626	+ ·0094	796
797	69 32·0	69 36·1	− 4·1	1·7036	1·6928	+ ·0108	4·5646	4·5523	+ ·0123	797
798	69 10·3	69 16·5	− 6·2	1·7185	1·7130	+ ·0055	4·5172	4·5274	− ·0102	798
799	69 59·6	69 55·9	+ 3·7	1·6717	1·6747	− ·0030	4·5912	4·5842	+ ·0070	799
800	69 40·2	69 42·4	− 2·2	1·6876	1·6852	+ ·0024	4·5549	4·5573	− ·0024	800
801	68 57·9	69 0·6	− 2·7	1·7372	1·7324	+ ·0048	4·5173	4·5154	+ ·0019	801
802*a*	68 48·7	68 54·9	− 6·2	1·7525	1·7431	+ ·0094	4·5210	4·5209	+ ·0001	802*a*
802*b*	68 49·5	68 54·9	− 5·4	1·7512	1·7431	+ ·0081	4·5207	4·5209	− ·0002	802*b*
803	68 56·9	69 1·0	− 4·1	1·7369	1·7327	+ ·0042	4·5125	4·5177	− ·0052	803
804	70 39·1	70 16·2	+ 22·9	1·5856	1·6500	− ·0644	4·5155	4·6007	− ·0852	804
805	69 15·5	69 15·1	+ 0·4	1·7210	1·7202	+ ·0008	4·5446	4·5408	+ ·0038	805
806	68 49·4	69 4·0	− 14·6	1·7542	1·7307	+ ·0235	4·5280	4·5243	+ ·0037	806
807	69 7·9	69 4·3	+ 3·6	1·7296	1·7303	− ·0007	4·5369	4·5244	+ ·0125	807
808	68 32·8	69 4·3	− 31·5	1·7773	1·7303	+ ·0470	4·5227	4·5244	− ·0017	808
809	68 58·2	69 4·3	− 6·1	1·7304	1·7303	+ ·0001	4·5009	4·5244	− ·0235	809
810	69 11·1	69 4·3	+ 6·8	1·7203	1·7303	− ·0100	4·5251	4·5244	+ ·0007	810
811	69 51·6	69 42·6	+ 9·0	1·6773	1·6865	− ·0092	4·5735	4·5616	+ ·0119	811
812	68 30·0	68 35·1	− 5·1	1·7618	1·7630	− ·0012	4·4726	4·4952	− ·0226	812
813	68 57·5	69 1·0	− 3·5	1·7377	1·7342	+ ·0035	4·5170	4·5217	− ·0043	813
814*a*	70 8·4	70 8·7	− 0·3	1·6583	1·6571	+ ·0012	4·5910	4·5889	+ ·0021	814*a*
814*b*	..	..	..	1·6561	1·6571	− ·0010	..	..	..	814*b*
815	70 0·6	69 50·4	+ 10·2	1·6631	1·6823	− ·0192	4·5718	4·5822	− ·0104	815
816	70 22·4	70 24·0	− 1·6	1·6400	1·6432	− ·0032	4·5989	4·6147	− ·0158	816
817	69 1·4	69 10·2	− 8·8	1·7352	1·7240	+ ·0112	4·5259	4·5314	− ·0055	817
818	69 52·1	69 58·4	− 6·3	1·6712	1·6683	+ ·0029	4·5590	4·5770	− ·0180	818
819	69 24·3	69 27·9	− 3·6	1·7160	1·7059	+ ·0101	4·5666	4·5541	+ ·0125	819
820	68 41·2	68 46·6	− 5·4	1·7544	1·7494	+ ·0050	4·4967	4·5048	− ·0081	820
821	68 50·1	68 37·5	+ 12·6	1·7513	1·7565	− ·0052	4·5233	4·4879	+ ·0354	821
822	70 20·6	70 23·8	− 3·2	1·6446	1·6427	+ ·0019	4·6041	4·6124	− ·0083	822
823	69 31·0	69 29·0	+ 2·0	1·7031	1·7037	− ·0006	4·5592	4·5527	+ ·0065	823
824	69 59·5	69 56·7	+ 2·8	1·6713	1·6757	− ·0044	4·5899	4·5903	− ·0004	824
825	69 55·3	69 56·5	− 1·2	1·6703	1·6706	− ·0003	4·5696	4·5754	− ·0058	825
826	68 41·6	68 44·7	− 3·1	1·7505	1·7532	− ·0027	4·4882	4·5072	− ·0190	826
827	69 14·2	69 21·7	− 7·5	1·7185	1·7073	+ ·0112	4·5327	4·5330	− ·0003	827
828	68 51·5	68 51·5	0·0	1·7426	1·7452	− ·0026	4·5063	4·5130	− ·0067	828
829	70 1·0	69 54·8	+ 6·2	1·6744	1·6769	− ·0025	4·6046	4·5856	+ ·0190	829
830	69 57·4	69 46·3	+ 11·1	1·6754	1·6862	− ·0108	4·5924	4·5760	+ ·0164	830
831	69 15·6	69 22·5	− 6·9	1·7122	1·7078	+ ·0044	4·5217	4·5375	− ·0158	831
832*a*	68 34·6	68 40·3	− 5·7	1·7575	1·7564	+ ·0011	4·4793	4·4983	− ·0190	832*a*
832*b*	..	..	..	1·7567	1·7564	+ ·0003	..	..	..	832*b*
833	69 19·4	69 22·6	− 3·2	1·7142	1·7120	+ ·0022	4·5420	4·5490	− ·0070	833
834	68 51·0	68 53·5	− 2·5	1·7461	1·7423	+ ·0038	4·5134	4·5134	·0000	834
835	70 13·2	70 0·7	+ 12·5	1·6500	1·6712	− ·0212	4·5881	4·5945	− ·0064	835

Table XXIV.—Summary of Declinations, Inclinations, Horizontal and

Ireland

No. 1891.	No. 1886.	Station.	Observer.	Year.	Latitude.	Longitude.	Declination.			No. 1891.
							Observed.	Calculated.	Difference.	
836		Mount Nugent	G	91	53° 49′ 34″	7° 18′ 15″	21° 42′·1	21° 48′·2	− 6′·1	836
837		Mountrath	W	92	53 0 16	7 28 40	21 44·2	21 34·4	+ 9·8	837
838		Moville	,,	92	55 10 47	7 4 12	22 10·7	22 9·2	+ 1·5	838
839		Mullingar	G	91	53 31 25	7 20 18	21 39·8	21 42·3	− 2·5	839
840		Naas	G	91	53 12 28	6 40 4	21 16·7	21 13·7	+ 3·0	840
841		Navan	,,	91	53 39 50	6 40 10	21 23·9	21 23·6	+ 0·3	841
842		Nenagh	,,	91	52 51 39	8 13 5	21 50·0	21 53·9	− 3·9	842
843		Newcastle West	,,	91	52 27 0	9 3 40	22 19·0	22 8·8	+ 10·2	843
844*a*		Newry (*a*)	,,	91	54 9 27	6 19 20	22 52·6	21 23·1	+ 89·5	844*a*
844*b*		,, (*b*)	,,	91	54 9 27	6 19 20	22 47·0	21 23·1	+ 83·9	844*b*
845		Oldcastle	G	91	53 44 21	7 12 15	21 37·9	21 42·9	− 5·0	845
846		Omagh	,,	91	54 36 28	7 18 45	22 1·5	22 5·9	− 4·4	846
847	189	Oughterard	R	87	53 26 10	9 19 1	23 0·6	22 43·3	+ 16·8	847
848	190	Parsonstown	R	87	53 5 47	7 54 57	21 48·4	21 49·7	− 1·3	848
849*a*		Pettigo (*a*)	G	91	54 32 47	7 49 10	22 10·7	22 21·3	− 10 6	849*a*
849*b*		,, (*b*)	,,	91	54 32 47	7 49 10	22 8·0	22 21·3	− 13·3	849*b*
850		Portumna	,,	91	53 5 48	8 13 34	22 9·6	22 0·4	+ 9·2	850
851*a*		Roscommon (*a*)	G	91	53 37 58	8 11 36	22 22·1	22 12·3	+ 9·8	851*a*
851*b*		,, (*b*)	,,	91	53 37 58	8 11 36	22 17·7	22 12·3	+ 5·4	851*b*
852		Shillelagh	G	91	52 45 12	6 31 36	21 4·3	20 58·3	+ 6·0	852
853		Skibbereen	,,	91	51 33 13	9 16 40	21 51·4	21 50·0	+ 1·4	853
854*a*	191	Sligo (*a*)	T	87	54 16 34	8 28 36	22 24·9	22 37·2	− 12·3	854*a*
854*b*		,, (*b*)	W	92	54 16 34	8 28 36	22 26·5	22 37·2	− 10·7	854*b*
855		Sneem	G	91	51 50 17	9 53 57	22 25·0	22 16·8	+ 8·2	855
856		Sperrin	W	92	54 47 26	6 59 50	21 53·6	21 58·9	− 5·3	856
857		Spiddle	G	91	53 14 48	9 17 8	22 46·2	22 37·3	+ 8·9	857
858	192	Strabane	T	87	54 49 48	7 28 20	22 7·7	22 16·0	− 8·3	858
859		Stradbally	G	91	53 0 38	7 9 20	21 33·3	21 24·6	+ 8·7	859
860		Stranorlar	,,	91	54 48 8	7 46 33	22 18·3	22 25·6	− 7·3	860
861		Street	,,	91	53 40 54	7 29 40	21 47·2	21 50·9	− 3·7	861
862		Taghmon	G	91	52 19 28	6 38 28	20 51·7	20 51·6	+ 0·1	862
863		Templemore	W	92	52 47 35	7 50 10	21 44·5	21 40·2	+ 4·3	863
864		Templepatrick (1)	,,	92	54 42 18	6 5 54	21 21·2	21 26·7	− 5·5	864
865		,, (2)	,,	92	54 42 18	6 6 8	22 12·2	21 26·7	+ 45·5	865
866		Thomastown	G	91	52 31 50	7 8 40	21 35·8	21 12·0	+ 23·8	866
867		Thurles	,,	91	52 40 28	7 48 50	21 38·0	21 36·1	+ 1·9	867
868	193	Tipperary	R	87	52 28 36	8 9 12	21 44·2	21 42·1	+ 2·1	868
869		Torr Head	W	92	55 11 47	6 5 48	21 23·5	21 36·3	− 12 8	869
870*a*	194	Tralee (*a*)	R	87	52 16 15	9 44 30	..	..	..	870*a*
870*b*		,, (*b*)	G	91	52 16 0	9 42 10	22 33·4	22 23·4	+ 10·0	870*b*
871		Tuam	,,	91	53 31 3	8 50 53	22 26·2	22 30·4	− 4·2	871
872		Tullamore	,,	91	53 14 26	7 31 40	21 46·5	21 41·8	+ 4·7	872
873		Tullow	,,	91	52 45 33	6 45 31	21 11·0	21 5·9	+ 5·1	873
874	195	Valentia (1)	R	87	51 55 34	10 17 40 }	22 36·0	22 31·1	+ 4·9	874
		,, (2)	..	..	51 55 22	10 17 25 }				
875*a*		,, (3)	G	91	51 54 30	10 18 10	22 33·8	22 31·1	+ 2·7	875*a*
875*b*		,, (4)	,,	91	51 54 30	10 18 10	22 29.0	22 31·1	− 2·1	875*b*
876		Warrenpoint	W	92	54 6 11	6 14 2	22 9·1	21 19·3	+ 49·8	876
877	196	Waterfoot	T	87	55 3 11	6 2 32	21 37·1	21 31·6	+ 5·5	877
878	197	Waterford	R	87	52 16 54	7 8 41	20 50·4	21 6·3	− 15·9	878
879	198	Westport	T	87	53 48 8	9 31 17	22 34·7	22 59·2	− 24·5	879
880	199	Wexford	R	87	52 21 27	6 27 18	20 41·1	20 47·2	− 6·1	880
881	200	Wicklow	,,	87	52 58 53	6 3 30	20 44·5	20 49·7	− 5·2	881
882		Youghal	G	91	51 57 58	7 52 0	21 22·3	21 20·2	+ 2·1	882

Vertical Forces, Observed and Calculated, with Differences (continued).

(continued).

No. 1891.	Inclination.			Horizontal Force.			Vertical Force.			No. 1891.
	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	Observed.	Calculated.	Difference.	
836	69° 54′·6	69° 42′·9	+ 11′·7	1·6714	1·6868	− ·0154	4·5697	4·5636	+ ·0061	836
837	69 10·6	69 14·9	− 4·3	1·7257	1·7171	+ ·0086	4·5374	4·5318	+ ·0056	837
838	70 22·2	70 27·4	− 5·2	1·6392	1·6384	+ ·0008	4·5958	4·6156	− ·0198	838
839	69 26·9	69 32·2	− 5·3	1·7056	1·6985	+ ·0071	4·5494	4·5517	− ·0023	839
840	69 12·5	69 16·8	− 4·3	1·7182	1·7138	+ ·0044	4·5251	4·5306	− ·0055	840
841	69 28·6	69 32·8	− 4·2	1·7031	1·6968	+ ·0063	4·5495	4·5496	− ·0001	841
842	69 12·9	69 14·9	− 2·0	1·7261	1·7185	+ ·0076	4·5476	4·5354	+ ·0122	842
843	68 58·9	69 5·6	− 6·7	1·7352	1·7300	+ ·0052	4·5161	4·5289	− ·0128	843
844*a*	70 3·3	69 48·0	+ 15·3	1·6579	1·6799	− ·0220	4·5685	4·5658	+ ·0027	844*a*
844*b*	..	..	..	1·6606	1·6799	− ·0193	..	..	..	844*b*
845	69 43·2	69 39·2	+ 4·0	1·6884	1·6908	− ·0024	4·5692	4·5594	+ ·0098	845
846	70 9·7	70 9·7	0·0	1·6593	1·6581	+ ·0012	4·5993	4·5959	+ ·0034	846
847	69 49·3	69 42·4	+ 6·9	1·6880	1·6906	− ·0026	4·5932	4·5719	+ ·0213	847
848	69 23·2	69 21·1	+ 2·1	1·7104	1·7111	− ·0007	4·5473	4·5408	+ ·0065	848
849*a*	70 16·4	70 11·1	+ 5·3	1·6478	1·6574	− ·0096	4·5954	4·5998	− ·0044	849*a*
849*b*	..	..	..	1·6435	1·6574	− ·0139	..	..	..	849*b*
850	69 24·7	69 23·4	+ 1·3	1·7079	1·7092	− ·0013	4·5466	4·5449	+ ·0017	850
851*a*	..	..	..	..	..	..	..	..	..	851*a*
851*b*	69 33·8	69 41·7	− 7·9	1·6987	1·6896	+ ·0091	4·5587	4·5636	− ·0049	851*b*
852	69 1·6	68 59·4	+ 2·2	1·7242	1·7329	− ·0087	4·4980	4·5120	− ·0140	852
853	68 32·9	68 34·3	− 1·4	1·7663	1·7651	+ ·0012	4·4950	4·4975	− ·0025	853
854*a*	70 11·0	70 6·0	+ 5·0	1·6544	1·6639	− ·0095	4·5910	4·5965	− ·0055	854*a*
854*b*	70 10·4	70 6·0	+ 4·4	1·6527	1·6639	− ·0112	4·5838	4·5965	− ·0127	854*b*
855	68 43·1	68 49·5	− 6·4	1·7550	1·7499	+ ·0051	4·5057	4·5173	− ·0116	855
856	70 17·5	70 13·8	+ 3·7	1·6495	1·6532	− ·0037	4·6048	4·5995	+ ·0053	856
857	69 29·3	69 35·5	− 6·2	1·7141	1·6975	+ ·0166	4·5817	4·5625	+ ·0192	857
858	70 17·1	70 18·3	− 1·2	1·6463	1·6490	− ·0027	4·5942	4·6067	− ·0125	858
859	69 7·0	69 13·1	− 6·1	1·7230	1·7185	+ ·0045	4·5161	4·5284	− ·0123	859
860	70 20·0	70 19·3	+ 0·7	1·6464	1·6485	− ·0021	4·6067	4·6096	− ·0029	860
861	69 43·0	69 38·6	+ 4·4	1·6889	1·6916	− ·0027	4·5697	4·5591	+ ·0106	861
862	68 50·2	68 44·5	+ 5·7	1·7403	1·7490	− ·0087	4·4952	4·4956	− ·0004	862
863	69 1·6	69 9·8	− 8·2	1·7299	1·7235	+ ·0064	4·5128	4·5283	− ·0155	863
864	71 51·6	70 5·0	+ 106·6	1·5374	1·6613	− ·1239	4·6927	4·5851	+ ·1076	864
865	72 33·8	70 5·0	+ 148·8	1·4863	1·6613	− ·1750	4·7322	4·5851	+ ·1471	865
866	68 47·5	68 55·5	− 8·0	1·7484	1·7382	+ ·0102	4·5057	4·5106	− ·0049	866
867	68 54·8	69 5·2	− 10·4	1·7360	1·7283	+ ·0077	4·5020	4·5228	− ·0208	867
868	68 57·6	69 0·5	− 2·9	1·7388	1·7342	+ ·0046	4·5203	4·5197	+ ·0006	868
869	70 32·3	70 22·0	+ 10·3	1·6297	1·6431	− ·0134	4·6119	4·6058	+ ·0061	869
870*a*	69 1·5	69 3·4	− 1·9	..	..	..	..	..	..	870*a*
870*b*	69 1·0	69 3·4	− 2·4	1·7355	1·7339	+ ·0016	4·5250	4·5304	− ·0054	870*b*
871	69 41·4	69 42·2	− 0·8	1·6937	1·6900	+ ·0037	4·5763	4·5695	+ ·0068	871
872	69 22·5	69 23·6	− 1·1	1·7083	1·7079	+ ·0004	4·5388	4·5421	− ·0033	872
873	68 57·9	69 1·5	− 3·6	1·7303	1·7305	− ·0002	4·4995	4·5140	− ·0145	873
874	68 46·6	68 54·8	− 8·2	1·7571	1·7447	+ ·0124	4·5246	4·5246	·0000	874
	..	..	..	..	..	..	..	..	..	
875*a*	68 48·9	68 54·8	− 5·9	1·7515	1·7447	+ ·0068	4·5191	4·5246	− ·0055	875*a*
875*b*	68 49·7	68 54·8	− 5·1	1·7516	1·7447	+ ·0069	..	..	..	875*b*
876	69 50·4	69 45·3	+ 5·1	1·6758	1·6826	− ·0068	4·5646	4·5622	+ ·0024	876
877	70 22·9	70 16·8	+ 6·1	1·6401	1·6487	− ·0086	4·6013	4·5996	+ ·0017	877
878	68 46·6	68 46·7	− 0·1	1·7443	1·7473	− ·0030	4·4916	4·4998	− ·0082	878
879	70 10·4	69 56·0	+ 14·4	1·6628	1·6758	− ·0130	4·6119	4·5876	+ ·0243	879
880	68 49·2	68 44·6	+ 4·6	1·7436	1·7487	− ·0051	4·5000	4·4953	+ ·0047	880
881	69 3·2	69 4·7	− 1·5	1·7236	1·7256	− ·0020	4·5028	4·5138	− ·0110	881
882	68 35·4	68 40·2	− 4·8	1·7572	1·7564	+ ·0008	4·4816	4·4979	− ·0163	882

LOCAL AND REGIONAL DISTURBING FORCES OBTAINED FROM THE TWO SURVEYS SEPARATELY AND COMBINED.

The magnitudes and directions of the Horizontal Disturbing Forces and the magnitudes of the Vertical Disturbing Forces were calculated for all the stations twice over.

(1) For stations at which observations were made in 1884–88, using the terrestrial lines deduced from the 1886 Survey.

(2) For stations at which observations were made in 1889–92, using the terrestrial lines deduced from the 1891 Survey.

(3) For all the stations, using the mean terrestrial lines deduced from both Surveys.

As has been already stated, the first two sets of results are entered in columns 4 to 6 of the following tables, the third set in columns 7 to 9.

F_1 and F are the magnitudes of the Horizontal Disturbing Forces.

ϕ_1 and ϕ the angles which their directions make with the north point on the geographical meridian, taken as positive when measured from north to west.

Z_1 and Z are the Vertical Disturbing Forces taken as positive when a north pole is urged downwards.

The Disturbing Forces have been recalculated for a number of the 1886 Survey stations and a few arithmetical errors detected.

Both the Horizontal and Vertical Disturbing Forces are expressed in terms of 0·0001 metric, or 0·00001 C.G.S. unit.

TABLE XXV.—Table of Disturbing Forces.

Scotland.

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
1	1	Aberdeen (1)	82	−144°	− 28	103	−150°	− 77
		Between—						
2		Aberdeen and Ellon (2) . .	224	−139	−176	199	−135	−121
3		,, ,, ,, (3) . .	382	−139	+ 11	357	−136	+ 67
4		,, ,, ,, (4) . .	142	− 26	−214	166	− 20	−159
		Between—						
5		Aberdeen and Stonehaven (5)	167	−149	− 52	140	−145	− 7
6		,, ,, ,, (6)	79	+ 87	+210	92	+ 70	+259
7		,, ,, ,, (7)	123	−161	−174	96	−159	−127
8		Abington	40	+ 4	−125	52	+ 6	−105
9		Aboyne	410	+166	− 90	388	+164	− 59
10		Achanalt	63	− 99	−190	58	− 90	−180
11		Achnashellach	82	−150	−251	73	−150	−247
12		Alford	34	+165	− 3	17	+123	+ 37
13		Altnabreac	73	+178	−212	63	+176	−169
14		Altnabarra	108	− 19	−330	115	− 17	−296

TABLE XXV.—Table of Disturbing Forces (continued).

Scotland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
15		Alyth	131	+ 38°	− 48	150	+ 34°	− 22
16		Arbroath	144	− 41	+ 105	159	− 34	+ 137
17		Ardgay	170	− 67	− 355	170	− 63	− 330
18		Ardrossan	29	− 38	+ 106	36	− 25	+ 107
19	2	Arinagower (Coll.)	..	Declination only observed...				..
20*a*		Auchnasheen (*a*).	80	− 62	− 72	81	− 56	− 67
20*b*		,, (*b*).	79	− 55	− 168	81	− 49	− 163
21		Auldgirth	5	+143	− 56	8	+ 30	− 36
22	3	L. Aylort (Gobbar Island) .	267 139	+141 +112	− 326 + 178	246	+130	− 51
23	4	Ayr	61	− 22	− 145	54	− 29	− 150
24	5	Ballater	151	−108	− 41	167	−115	− 68
25		Ballindalloch	103	− 56	− 19	112	− 45	+ 15
26		Balmeanach (Skye)	610	−119	+1031	607	−119	+1008
27	6	Banavie	176	+ 18	+ 268	163	+ 18	+ 269
28	7	Banff	112	+ 70	− 124	100	+ 83	− 188
29		L. Bay	332	+ 93	+ 988	333	+ 94	+ 955
30		Bearraraig (Skye)	103	−174	− 65	103	−175	− 88
31		Bernera (Barra Head) . . .	444	±180	+ 408	443	±180	+ 376
32		Bervie	103	−158	− 103	80	−155	− 64
33	8	Berwick	179	− 15	+ 230	162	− 17	+ 180
34		Bettyhill	64	− 48	− 100	66	− 44	− 75
35		Blair Athol	14	− 56	− 220	28	− 15	− 201
36	9	Boat of Garten	212	+ 86	+ 56	205	+ 91	+ 32
37	10	L. Boisdale (S. Uist) . . .	301	−114	− 736	301	−113	− 688
38		Braemar	95	+ 7	− 353	117	+ 8	− 330
39		Braemore (L. Broom) . . .	78	− 21	+ 20	85	− 17	+ 29
40		Bridgend (Islay)	406	+ 86	+ 419	410	+ 86	+ 390
41		Broadford	459	+131	+ 435	457	+131	+ 414
42		Brodick (Arran)	214	+ 81	+ 228	219	+ 78	+ 223
43		Broughton	14	+ 65	− 30	25	+ 34	− 3
44		Buckie	217	+ 92	− 17	223	+ 86	+ 34
45	11	Bunnahabhain (Islay) . . .	265	+ 70	+ 122	260	+ 71	+ 149
46		Cabrach	165	−174	− 58	142	−175	− 17
47		Cairn-o'-Mount	59	+113	− 38	60	+ 88	− 2
48		Callander	223	+ 18	+ 129	240	+ 18	+ 138
49	12	Callernish (Lewis)	45	+ 21	+ 31	64	+ 20	+ 86
50		Camas-nan-Gall (Lochaber) .	17	+ 52	+ 157	33	+ 43	+ 172
51	13	Campbelton	36	+136	− 9	40	+146	+ 4
52	14	Canna	737	−112	+1839	741	−112	+1871
53		Carskey (Cantyre)	..	..	+ 15	..	..	+ 4
54		Carsphairn	22	−162	− 130	12	−156	− 115
55	15	Carstairs	173	+ 14	− 79	159	+ 14	− 103
56		Castle Bay (Barra)	503	−120	− 184	510	−121	− 209
57		Castle Douglas	11	+ 63	− 70	17	+ 40	− 52
58		L. Chean Chuisil (Lewis) .	159	− 28	− 37	149	− 30	− 59
59		Clonaig (Cantyre)	193	+167	− 537	185	+166	− 549
60		Cock Bridge	24	+ 12	− 181	48	+ 13	− 146
61		L. Corrie (Argyllshire) . .	25	−108	+ 119	17	− 77	+ 121
62		Craigendowie	76	+ 25	− 191	100	+ 22	− 141
63	16	Crianlarich	39	+ 83	− 219	37	+107	− 225

TABLE XXV.—Table of Disturbing Forces (continued).

Scotland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
64	17	Crieff	114	+74°	+217	107	+92°	+202
65		Crieff Junction	203	−159	−81	188	−147	−64
66		L. Crinan	81	+96	−142	85	+89	−159
67		Cuil Bay	70	−24	+32	81	−17	+28
68	18	Cumbrae	222	+174	+215	233	+175	+208
69		Cupar	52	+133	+102	45	+111	+134
70		Dalmally	195	+46	−150	206	+43	−175
71	19	Dalwhinnie	127	+36	−247	110	+39	−258
72		Dingwall	254	−129	−29	243	−127	−13
73		Dinwoodie	60	+68	−137	64	+59	−106
74		Dolphinton	77	+31	−32	91	+27	−6
75		Island Donnan (L. Alsh)	164	+160	−3	157	+158	−12
76		L. Doon (Dalmellington)	67	+62	−152	74	+56	−138
77		Dufftown	119	+48	+274	139	+43	+314
78		L. Duich	148	+102	+150	153	+98	+158
79	20	Dumfries	29	+56	−87	24	+73	−107
80		Dunbar	26	+127	−141	24	+83	−100
81		Dunblane	153	−147	−164	137	−144	−151
82	21	Dundee	23	±180	+10	45	−174	−23
83		Dunkeld	260	−107	+61	250	−102	+79
84		Earlston	5	−158	−43	11	0	−13
85	22	Edinburgh	17	+152	+107	33	+171	+74
86	23	Elgin	86	−67	+45	85	−81	+4
87		Ellon	71	−169	−81	42	−170	−17
88		Elvanfoot	81	+172	+37	69	+170	+59
89	24	L. Eriboll (Camas Bay)	37	−56	+175	38	−55	+159
90		Ewe Island	300	−83	−311	298	−83	−314
91	25	Fairlie	..	..	+135	..	..	+127
92		Falkirk	434	−169	+36	418	−170	+56
93		Forres	16	+55	−52	34	+33	−20
94		Forsinard	129	+67	−9	137	+63	+34
95	26	Fort Augustus	74	−101	+57	84	−110	+53
96		Fraserburgh	108	+170	−126	82	+161	−50
97		L. Gair (Argyllshire)	134	−157	−363	122	−156	−372
98*a*	27	Gairloch	129	±180	−408	173	−179	−389
98*b*		Gairloch (Flowerdale)	148	−134	−488	148	−135	−510
99		Girvan	82	+76	−108	86	+109	−104
100		Glamis	41	+146	−51	31	+115	−24
101	28	Glasgow	117	−133	−80	129	−136	−89
102		Glen Afric	181	−125	+102	173	−123	+98
103		Glencaird	76	−167	−98	69	−167	−91
104		Glen Tilt (1)	306	+20	−70	326	+20	−56
105		,, ,, (2)	155	−2	−175	175	0	−158
106		Glenwhilly	45	−159	−94	38	−157	−91
107*a*	29	Golspie	89	−92	−65	96	−100	−99
107*b*		,,	104	−120	−104	94	−114	−66
108		Grant's House	67	+177	−9	47	+173	+42
109		Greenlaw	19	+96	−92	24	+55	−52
110		Gretna	52	+148	−55	43	+146	−21

TABLE XXV.—Table of Disturbing Forces (continued).

Scotland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
111		Halkirk	80	−130	−246	70	−124	−202
112		Hamilton	63	+ 18	− 22	77	+ 17	− 9
113	20	Hawick	76	− 1	− 99	63	− 3	−135
114		Helmsdale	200	−159	+ 13	183	−158	+ 64
115		Heriot	11	− 95	− 98	17	− 31	− 67
116		L. Hourn	81	−149	− 42	69	−148	− 37
117		Huntly	146	+ 97	−194	150	+ 87	−147
118		Inchmarnock	..	..	..	..	..	..
119	31	L. Inver	326	−129	−853	326	−129	−853
120		Inverary	24	− 81	−194	24	− 50	−197
121	32	Inverness	61	0	+156	45	− 6	+132
122		Inverurie	201	+ 94	+ 12	207	+ 87	+ 62
123	33	Iona	326	+ 59	+310	321	+ 60	+342
124		Jedburgh	59	− 31	+ 57	69	− 25	+ 52
125		Keith	230	+103	− 34	231	+ 97	− 17
126		Kelso	195	+156	+253	180	+154	+297
127		Kennethmont	265	−170	− 18	240	−170	+ 25
128		Kilconquhar	69	−179	−113	50	+177	− 78
129		Kildonan	112	−107	−285	106	−101	−245
130		Killin	56	−162	−273	40	−158	−277
131		Kinbrace	27	− 84	−203	30	− 44	−141
132		Kingussie	187	− 10	− 99	205	− 7	− 85
133		Kinloch Aline	95	− 48	+201	98	− 42	+181
134		Kinloch Eil.	77	−127	+170	67	−120	+164
135		Kinlochewe	79	− 59	− 20	81	− 53	− 19
136		Kinross	55	− 57	+ 66	67	− 39	+ 82
137		Kirkcaldy	182	−163	+ 10	163	−162	+ 43
138		Kirkcudbright	17	− 10	− 79	24	− 7	− 59
139	34	Kirkwall	27	− 39	+109	7	−124	+ 42
140		Kirriemuir	50	+ 69	− 91	65	+ 53	− 63
141*a*	35	Kyle Akin (*a*)	140	+154	−168	173	+156	−142
141*b*		,, ,, (*b*)	197	+165	− 87	193	+164	−105
142*a*	36	Lairg (*a*)	73	− 79	− 34	76	− 87	− 68
142*b*		,, (*b*)	95	−135	−123	86	−133	− 95
142*c*		,, (*c*)						
143		Langholme	13	+167	− 69	4	+124	− 36
144		Leadburn	117	− 84	+ 9	117	− 76	+ 37
145	37	Lerwick	62	−144	+378	..	..	..
146		L. Leven	320	+ 25	−130	333	+ 25	−135
147	38	Lochgoilhead	23	+122	−328	28	+148	−324
148		L. Lochy	113	+ 79	+275	122	+ 72	+275
149		Lockerbie	42	+ 44	− 30	51	+ 36	+ 2
150		Lowlander's Bay (L. Skiport)	216	+ 94	−517	219	+ 95	−539
151		Lowlandman's Bay (Jura)	170	+ 80	− 67	176	+ 77	− 89
152		McCormack Bay (L. Skiport)	281	− 58	..	275	− 59	..
153*a*	39	L. Maddy (*a*)	123	− 66	− 26	122	− 65	+ 16
153*b*		,, (*b*)	142	− 22	..	138	− 24	..
154		Mallaig (L. Nevis)	238	±180	−228	230	+179	−247

TABLE XXV.—Table of Disturbing Forces (continued)

Scotland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
155		L. Melfort	174	− 12	− 208	185	− 10	− 214
156		Moffat	53	+129	− 101	47	+117	− 71
157		Monikie	113	− 50	− 22	127	− 43	+ 20
158		Montrose	11	− 41	− 51	33	− 7	− 17
159		L. More	119.	− 31	− 301	120	− 30	− 378
160		L. Nevis	143	+165	− 15	134	+161	− 13
161		New Cumnock	45	−102	− 101	42	− 87	− 87
162		New Galloway	30	−110	+ 22	27	− 92	+ 39
163		Newmilns	135	+178	+ 573	123	+177	+ 584
164*a*		Newton Stewart (*a*)	4	0	+ 132	10	+ 17	+ 143
164*b*		,, ,, (*b*)	..	..	+ 13	..	..	+ 24
165*a*	40*a*	Oban (*a*)	143	+ 11	− 129	130	+ 10	− 117
165*b*	40*b*	,, (Kerrera) (*b*)	196 219	+ 17 + 16	− 132 − 124	195	+ 16	− 130
166		Ord (L. Eishort)	148	+146	− 118	146	+144	− 139
167		Ornsay (Skye)	411	−142	+ 330	404	−142	+ 309
168		Oronsay	122	−167	+ 82	113	−168	+ 51
169		Overscaig	161	− 23	+ 331	164	− 21	+ 347
170		Parton	40	−173	− 83	31	−171	− 65
171		Peebles	9	+126	− 88	12	+ 42	− 62
172		Penwherry	359	+ 19	+ 181	367	+ 19	+ 187
173		Persie Hotel	190	−163	− 139	169	−163	− 114
174		Perth	87	−130	− 160	72	−120	− 132
175		Pinvalley	180	+ 50	+ 96	161	+ 48	+ 108
176	41	Pitlochrie	33	− 63	− 242	34	− 97	− 260
177		Poolewe	150	− 92	− 286	149	− 92	− 300
178	42	Port Askaig (Islay)	309	+ 53	+ 141	302	+ 54	+ 163
179		Port Ellen	268	+ 14	+ 27	275	+ 15	− 3
180		Port of Ness	75	+ 26	− 17	62	+ 32	− 30
181		Port Patrick	44	−153	− 46	39	−150	− 48
182*a*	43*a*	Portree (*a*)	619	+145	+ 712	622	+145	+ 731
182*b*	43*b*	,, (*b*)	384	+ 11	− 378	381	+ 10	− 362
182*c*	43*c*	,, (*c*)	806	− 89	+1705	813	− 90	+1721
183		Raasay	489	+168	− 257	488	+167	− 282
184		L. Rannoch	197	+ 89	− 153	203	+ 84	− 140
185*a*		L. Ranza (*a*)	411	−158	− 23	400	−158	− 30
185*b*		,, (*b*)	336	−141	− 18	326	−148	− 28
186		Riccarton Junction	8	+ 45	− 152	20	+ 18	− 118
187		L. Riddan	13	−141	− 360	4	− 45	− 365
188		East L. Roag (Lewis)	..	..	− 95	..	..	− 76
189		Rodel (Harris)	805	− 47	+ 112	794	− 47	+ 91
190		Rona (South)	147	−149	− 142	146	−150	− 165
191		Ronachan (Cantyre)	47	− 56	− 66	49	− 45	− 80
192	44	Row (Gairloch)	121	−170	− 188	134	−169	− 188
193		Rum	142	−124	+ 286	137	−124	+ 256
194		Ruthwell	9	+ 70	− 87	16	+ 30	− 58
195		Saint Andrews	55	+116	− 99	54	+ 93	− 60
196		Saint Mary's Loch	36	+ 58	− 103	45	+ 45	− 74

TABLE XXV.—Table of Disturbing Forces (continued).

Scotland (continued).

No. 1891.	No. 1886.	Station.	F₁.	ϕ_1.	Z₁.	F.	ϕ.	Z.
				°			°	
197		Saint Ninian's Bay (Bute) .	..	..	− 65	..	..	− 74
198		Salen (L. Sunart)	131	− 40	+ 57	136	− 37	+ 41
199		Sandag Bay (L. Hourn) . .	348	+138	+ 61	345	+137	+ 45
200		Sanquhar	35	−133	− 56	27	−118	− 37
201	45	Scarnish (Tiree)	394	+ 98	+444	391	+ 98	+481
202		Scoraig	482	− 25	+507	484	− 25	+504
203		Scourie	496	+124	−596	498	+124	−594
204		Selkirk	53	− 8	− 42	70	− 4	− 11
205		L. Shin (*a*).	165	−163	−406	158	−163	−384
206		,, (*b*)	81	−169	−274	73	−170	−252
207		L. Slapin	403	− 59	+202	403	− 58	+181
208		L. Sligachan	446	−137	+472	442	−137	+448
209	46	Soa (Skye)	518	−166	−385	524	−166	−365
210		,, ,, ...	515	−166	−170	510	−166	−195
211		L. Spelve (Mull)	1209	+ 24	+310	1217	+ 24	+284
212		Spital of Glenshee	213	−132	−149	196	−129	−124
213		L. Stack	270	− 51	− 99	270	− 51	− 94
214		L. Staffin	174	−107	+ 53	176	−108	+ 22
215		Stanley Junction	37	−119	− 49	27	− 86	− 16
216	47	Stirling	166	+177	− 92	182	+178	−106
217		Stonehaven	99	+ 18	− 63	126	+ 16	− 20
218*a*	48*a*	Stornoway (Ard Point) . .	179 198 278	+109 +120 +114	.. + 46 +120	177	+108	+157
218*b*	48*b*	Stornoway Castle	175	+130	−113	170	+145	− 74
219	49	Strachur	88	− 1	−269	76	− 4	−269
220*a*	50	Stranraer	38 65 62	+178 −178 +175	− 72 − 34	55	−176	− 54
220*b*		,, ...						
221		L. Striven	..	..	−220	..	..	−220
222		Strome Ferry	167	−176	− 47	161	−178	− 58
223	51	Stromness	80	− 25	+146	76	− 28	+ 88
224		Tain	160	−132	− 80	147	−129	− 44
225		Talladale (L. Maree) . . .	247	+154	−349	245	+153	−355
226		Tanera More (Summer Isles)	346	−155	−336	345	−155	−334
227	52	East L. Tarbert (L. Fyne) .	54	−167	−150	65	−166	−137
228		West L. Tarbert	19	− 25	− 53	8	− 14	− 72
229		Tarbet	86	−153	−282	72	−150	−241
230		Temple (Urquhart)	65	−150	+ 94	49	−147	+110
231		Thornhill	7	− 27	+ 23	16	− 7	+ 46
232*a*	53	Thurso	20	− 53	− 47	19	− 84	− 88
232*b*		,, ...	30	− 70	−120	31	− 84	−125
233		L. Torridon	161	−137	−121	156	−137	−126
234		Torrisdale (Cantyre) . . .	85	−157	−145	75	−157	−155
235		L. Tosgach	127	+154	− 63	125	+152	− 84
236		Toumintoul	36	− 21	− 90	57	− 7	− 57
237		Troon	272	+ 31	− 11	+284	+ 30	− 3
238		Uig	686	+148	+ 27	689	+148	− 3
239		Ullapool	107	+176	+160	103	+174	+167

TABLE XXV.—Table of Disturbing Forces (continued).

Scotland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
240		Watcarrick (Eskdalemuir) .	38	+ 97	− 72	38	+ 81	− 41
241		Whitburn	189	+ 50	+147	199	+ 47	+165
242		Whithorn	50	+ 20	− 51	56	+ 19	− 38
243*a*	54	Wick.	150	−146	+242	160	−148	+182
243*b*		„	157	−150	+ 33	141	−148	+ 97
244		Wigtown	25	+135	− 51	22	+120	− 41

England and Wales.

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
245		Abergavenny	27	+ 6°	− 76	27	0°	− 56
246		Abergwynolwyn	105	− 3	−194	100	− 5	−186
247	55	Aberystwith	77	− 83	− 78	73	− 77	− 81
248		Abingdon	70	−133	+123	64	−125	+180
249		Alcester	110	−105	−213	112	−103	−171
250		Aldeburgh	32	+139	−116	22	+ 90	− 3
251	56	Alderney	117	− 94	− 43			
252		Alfreton	34	−111	+ 73	38	−105	+115
253	57	Alnwick	29	+ 28	− 50	19	+ 51	− 99
254	58	Alresford	48	− 47	+ 6	41	− 67	− 62
255*a*		Alston (*a*)	31	+ 6	−315	36	0	−284
255*b*		„ (*b*)	62	+ 19	−161	66	+ 15	−130
256		Ambleside	66	−180	− 52	60	−179	− 19
257		Amlwch	60	−137	+195	64	−137	+203
258	59	Appleby	69	+168	− 56	76	+167	− 90
259		Appledore	12	− 81	−100	29	− 12	− 10
260		Armathwaite	84	+ 17	− 44	91	+ 14	− 8
261		Ashbourne	80	− 42	−129	85	− 45	− 96
262		Atherstone	211	+124	− 1	205	+124	+ 42
263		Axbridge	31	+ 57	+ 7	33	+ 47	+ 31
264		Aysgarth	108	−176	− 96	102	−174	− 36
265		Bakewell	161	− 34	+ 80	166	− 35	+116
266		Bala	123	+ 77	− 54	117	+ 80	− 48
267		Barmouth (1)	418	− 27	+ 90	414	− 27	+ 95
268		„ (2)	264	+ 10	+199	257	+ 9	+205
269		Barnard Castle	106	−152	−153	101	−150	− 92
270		Barnsley	23	+ 95	+ 21	18	+ 93	+ 56
271	60	Barrow	35	− 85	− 71	33	− 94	− 92
272		Barton Hill	98	+136	− 70	91	+135	+ 2
273		Barton-on-Humber	97	+113	+118	90	+113	+165
274		Basingstoke	99	− 11	− 9	114	− 9	+ 54
275		Beaumaris	120	+155	+151	122	+158	+158
276		Beccles	83	+176	−137	61	+173	− 31
277	61	Bedford	132	+168	+ 39	146	+167	− 35
278		Bellingham	32	+ 5	−165	42	+ 1	−129
279		Bettws-y-coed	174	+144	+120	176	+146	+128
280		Beverley	139	+116	− 64	135	+116	+ 10
281		Bewdley East	10	+107	−128	5	+127	− 97
282		Bewdley West.	21	+ 95	− 97	16	+ 97	− 66
283		Bideford	85	+175	− 70	88	+177	− 70

TABLE XXV.—Table of Disturbing Forces (continued)

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
284		Bingham	19	−58	+111	25	−56	+156
285	62	Birkenhead.	15	+8	+26	19	+18	+7
286	63	Birmingham	124	−40	+152	119	−39	+100
287		Bishop Auckland	124	−155	−202	119	−152	−156
288		Bishop's Castle	71	−178	−13	74	−174	+3
289		Bitterley (Ludlow)	51	+92	−78	46	+94	−53
290		Blakeney	73	−128	−35	71	−123	−18
291		Blandford	6	−108	−144	11	−34	−104
292		Bootle	47	−132	−47	46	−126	−25
293		Boroughbridge	52	+144	+115	47	+144	+178
294		Boston	134	+63	+41	134	+60	+115
295		Boulmer (1)	..	..	−167	..	..	−120
296		,, (2)	30	−140	−90	23	−119	−43
297		,, (3)	18	−41	−93	29	−27	−46
298		,, (4)	22	−112	−154	21	−79	−107
299		Bourne	28	−49	−91	35	−45	−31
300		Bourton-on-the-Water . . .	179	−113	−7	179	−110	+40
301		Bovey Tracey	128	−12	−99	132	−12	−92
302	64	Braintree	91	+136	+50	104	+145	−42
303	65	Brecon	28	−135	+7	23	−135	−8
304		Brent Tor (1)	158	+30	+10	157	+30	+10
305		,, (2)	39	+27	..	39	+26	
306		Bridgend	46	−24	−91	50	−25	−68
307		Brigg	76	+114	+108	68	+112	+172
308		Brightlingsea	48	+173	−113	26	+159	−13
309		Bromsgrove	124	−61	−33	129	−61	+4
310		Bromyard	35	−173	−107	35	−168	−80
311*a*	66*a*	Bude Haven (*a*)	65	+143	+91	52	+157	+67
311*b*	66*b*	,, (*b*)	48	±180	+30			
312		Buildwas	35	+83	−104	30	+88	−87
313		Builth	66	+163	−35	69	+168	−28
314		Burnley	85	−114	+76	88	−111	+110
315		Burrough-on-the-Hill . . .	125	+64	+23	122	+61	+76
316		Burton-on-Trent	17	−14	−13	18	−34	+20
317		Bury St. Edmunds	16	+128	−77	16	+55	+17
318		Butterwick-on-Trent . . .	52	+23	+165	53	+16	+220
319		Buxton	59	−17	+34	61	−21	+68
320		Caermarthen	111	−171	−31	119	−169	−38
321		Caerphilly	16	−166	−9	15	−152	+11
322	67	Cambridge	57	+158	+110	71	+162	+29
323*a*	68	Cardiff (*a*)	32	−35	−53	29	−31	−62
323*b*		,, (*b*)	33	−29	−48	36	−32	−32
324	69	Cardigan	67	−175	−52	58	−179	−52
325	70	Carlisle	41	+77	−52	41	+90	−82
326		Carnarvon	74	−123	+223	80	−124	+227
327		Carno	71	−173	+12	78	−169	+16
328		Castle Cary	27	−17	−55	36	−13	−22
329		Castleton	41	−41	+38	47	−45	+76
330		Chelmsford	94	+148	−27	79	+138	+63
331*a*	201	Chepstow (*a*)						
331*b*		,, (*b*)	10	+96	−5	7	+74	+26
332		Chester	34	+3	−64	30	−6	−54

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
333	71	Chesterfield	56	+78	+145	58	+86	+76
334	72	Chichester	46	+37	+130	29	+55	+66
335		Chilcompton	11	+135	−55	7	+106	−23
336		Chippenham	69	−64	−39	74	−59	+3
337		Cirencester	129	−133	−76	127	−130	−34
338	73	Clenchwarton	77	+67	+207	76	+76	+123
339	74	Clifton	27	+57	+33	28	+69	0
340	75	Clovelly	63	+179	+21	59	+176	+27
341		Clun	53	+128	+19	53	+134	+34
342		Coalport	67	−154	−79	68	−151	−45
343	76	Coalville	57	−63	−109	52	−65	−157
344		Cockermouth	31	+33	−43	38	+27	−16
345	77	Colchester	133	+102	−99	138	+112	−201
346		Coleshill	56	−126	+1	57	−121	+44
347		Congleton	66	−43	−86	68	−49	−63
348		Coniston	80	−150	+44	75	−146	+75
349		Corby (Lincoln)	56	+50	−48	58	+42	+11
350		Corfe Castle	27	−94	−120	29	−70	−86
351		Corley Ash	78	−73	+87	82	−71	+130
352		Craven Arms	72	+69	+47	68	+64	+64
353		Crickhowel	66	−47	+15	67	−49	+32
354	78	Cromer	25	+92	+208	34	+120	+100
355		Crosby (Isle of Man)	186	−117	+20	185	−116	+32
356		Crynant	45	+53	+98	38	+56	+99
357		Cuckfield	162	+111	+206	159	+104	+281
358		Dartford	33	+48	−99	49	+39	−21
359		Dartmouth	20	+147	−130	16	+142	−128
360		Daventry	133	+143	−185	126	+143	−138
361		Dawley (Salop)	19	+9	−118	15	−2	−101
362		Deal	122	−104	−30	111	−91	+69
363		Derby	124	−64	−37	129	−64	+1
364		Dereham	45	+81	+89	46	+62	+180
365		Desford	80	−99	−97	83	−96	−52
366		Devynock	30	+163	+58	35	+172	+69
367		Dhoon Glen (Isle of Man)	96	−137	−27	96	−138	−14
368		Dinas Mawddy	140	−54	−117	142	−57	−112
369		Diss	24	+20	+20	43	+9	+119
370		Dolygaer (Merthyr Tydvil)	19	+96	−51	15	+101	−34
371		Doncaster	19	−12	+87	24	−19	+154
372		Dorrington	97	−162	−48	100	−160	−29
373	79	Dover	60	−102	+21	79	−121	−78
374		Downham Market	57	+10	+68	70	+6	+151
375		Drewsteignton	279	+46	+461	279	+46	+463
376		Dunchurch	131	+101	+25	127	+98	+75
377		Durham	45	−100	−65	46	−88	−17
378		Eastbourne	33	+162	−202	17	+114	−122
379		East Grinstead	32	+94	−115	41	+61	−39
380		Eggesford	45	+130	+26	43	+132	+32
381		Ely	25	+99	−88	25	+64	−7
382		Eskdale (1)	23	−160	−49	18	−151	−24

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
383		Eskdale (2)	18	−103	+ 14	19	− 84	+ 39
384		Etchingham	31	−157	−216	10	−127	−135
385		Exhall	189	+138	+ 43	183	+138	+ 85
386	80	Falmouth	47	+175	−190	45	+175	−169
387		Faringdon	124	−110	+192	122	−106	+244
388		Fenny Compton	91	+159	+ 86	84	+159	+139
389		Ferryside	122	−118	+293	130	−120	+286
390		Fleetwood	46	− 68	− 15	50	− 68	+ 8
391		Foggathorpe	Dip only observed.					
392		Ford Junction	35	+108	−104	38	+ 75	− 40
393		Forncett	31	+101	− 17	33	+ 67	+ 80
394		Freshwater.	..	..	−132	..	..	− 88
395	81	Gainsborough	42	− 36	+132	36	− 32	+ 87
396		,,	30	− 17	+ 15	39	− 27	+ 48
397		Garstang	21	− 67	− 24	24	− 66	− 2
398	82	Giggleswick	49	− 45	+ 12	44	− 45	− 20
399	83	Gloucester	46	+126	+ 46	51	+128	+ 4
400	202	Goodrich	Dip only observed.					
401		Gospel Oak	47	+ 16	+263	49	+ 11	+306
402	84	Grantham	41	− 7	+ 50	35	0	− 10
403		Gravesend	42	+ 86	−100	51	+ 62	− 17
404		Great Dalby	178	+ 70	+212	176	+ 68	+263
405		Great Driffield	129	+125	−134	123	+125	− 67
406		Great Grimsby	45	+133	+ 26	38	+133	+ 96
407	G	Greenwich	36	+ 79	− 5	34	+110	− 19
408		Grosmont	22	+ 66	−167	22	+ 43	−114
409	85	Guernsey (L'Erée)	101	−134	− 13	outside the range of the second survey.		
410	86	,, (Peter Port).	56	− 96	+ 49			
411		Guildford	74	+ 24	− 60	93	+ 20	+ 10
412		Guisboro'	19	−146	−130	17	−149	− 80
413		Halesowen	124	− 60	+ 46	128	− 60	+ 80
414		Halesworth	44	+149	− 96	28	+122	+ 8
415		Haltwhistle	38	−155	−177	32	−145	−143
416		Hampton	92	−139	−177	93	−137	−142
417		Harbottle	68	− 9	−127	81	− 9	− 80
418		Harby	73	+ 47	+157	95	+ 43	+204
419	88	Harpenden	70	+148	+146	83	+154	+ 73
420		Harrogate	1	− 45	+160	4	− 45	+222
421	87	Harwich	30	+ 17	+ 79	7	+ 63	− 28
422	89	Haslemere	44	+ 30	+ 87	28	+ 43	+ 18
423		Hassock's Gate	36	+111	−118	39	+ 77	− 41
424		Haverfordwest	96	− 69	+102	97	− 76	+ 82
425		Hawes	126	+150	+ 11	127	+145	+ 63
426		Hay	74	−156	− 35	79	−156	− 18
427		Hayfield	46	− 83	−188	52	− 80	−153
428		Heathfield	37	±180	−208	16	+165	−129
429		Helmsley	69	+127	+ 44	67	+126	+ 94
430		Helstone	52	+137	−114	54	+138	−136
431		Hemyock	17	+ 87	− 82	16	+ 72	− 65
432		Henley-on-Thames	43	− 82	+113	47	− 63	+177

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
433*a*	203	Hereford	Dip only observed.					
433*b*		,, ...	60	+140	− 17	58	+143	+ 9
434		Hesket Newmarket	59	+136	− 20	52	+132	+ 10
435		Hexham	14	− 30	− 97	22	− 27	− 59
436		High Wycombe	153	+143	+ 22	142	+138	+ 92
437		Hinckley	84	+168	− 89	80	+171	− 46
438		Holsworthy	42	+144	− 7	42	+149	− 10
439		Holt	53	+ 99	+ 66	48	+ 83	+152
440	90	Holyhead	153	−166	+ 21	149	−167	+ 17
441		Hopton Wafers (Cleobury Mortimer)	36	+161	−112	36	+166	− 86
442		Horncastle	35	+114	+ 35	32	+108	+108
443	91	Horsham	57	+ 73	+ 20	51	+ 93	− 54
444		Howden	33	+ 81	+117	31	+ 74	+180
445		Huddersfield	47	−145	+ 58	49	−139	+ 93
446	92	Hull	124	+136	+ 94	131	+135	+ 32
447		Hunstanton	24	+120	+ 60	17	+ 97	+135
448		Hythe	48	−122	−147	35	− 92	− 57
449	93	Ilfracombe	36	−162	− 2	30	−165	− 3
450		Ilkley	56	− 84	+ 86	61	− 81	+143
451		Ilminster	14	+ 4	−109	20	0	− 88
452		Ipswich	12	+ 14	+ 37	36	+ 8	+142
453		Ireby	113	−173	− 66	105	−172	− 40
454	94	Jersey. Grouville	168	+ 77	+ 9	Outside the range of the second survey.		
455	95	,, St. Louis	144	−103	−229			
456	96	,, St. Owen	65	+144	−131			
457		Kegworth	35	− 97	+ 56	40	− 90	+ 99
458		Kendal	43	+173	− 1	39	+177	+ 28
459	97	Kenilworth	103	+173	+287	108	+172	+232
460		Keswick	44	− 36	− 18	51	− 32	+ 9
461	98	Kettering	59	+150	− 92	68	+153	−157
462		Kettlewell	60	− 44	+ 93	65	− 41	+153
463*b*	99	Kew	90	+119	+162	97	+130	+119
464		Kidderminster	52	− 91	−178	56	− 90	−148
465		King's Langley	107	+ 70	+183	115	+ 62	+259
466*a*	100*a*	King's Lynn (*a*)	46	+ 19	+195	36	+ 31	+109
466*b*	100*b*	,, ,, (Gaywood) . .	40	+ 60	+139	39	+ 73	+ 52
467	101	King's Sutton	85	+138	+121	93	+141	+ 61
468		Kingswood	..	..	+129	..	..	+171
469		Kington	79	+121	..	78	+125	..
470		Kirkby Lonsdale	21	− 31	+ 14	27	− 31	+ 44
471		Kirkby Stephen	74	+174	−103	73	+164	− 44
472		Knighton	73	+101	− 30	70	+103	− 12
473	102	Lampeter	81	−123	−137	73	−120	−144
474		Lancaster	27	0	− 47	30	− 8	− 18
475		Launceston	90	+ 11	+ 30	89	+ 10	+ 28
476		Ledbury	86	−130	− 33	87	−127	− 1
477	103	Leeds	45	− 51	+ 59	39	− 50	+ 21
478	104	Leicester	108	− 95	− 27	105	− 98	− 90

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
479		Leighton Buzzard	59	+163	+ 16	46	+160	+ 86
480		Leominster	19	− 21	+ 43	20	− 33	+ 64
481		Levisham	58	+138	− 77	50	+137	− 28
482		Lewes	28	+125	− 33	28	+ 75	+ 47
483		Lew Trenchard	77	+ 34	+ 46	75	+ 33	+ 44
484		Lichfield.	131	+169	+ 5	129	+171	+ 42
485*a*	105	Lincoln (*a*).	74	− 63	+169	67	− 65	+124
485*b*		„ (*b*).	55	− 72	− 20	62	− 70	+ 31
486		Linton (Cambs.)	86	+147	− 54	72	+138	+ 37
487		Lizard Down	47	+125	−129	49	+127	−151
488		Llandilo	126	−156	+ 44	133	−156	+ 45
489		Llandovery	85	−142	− 12	93	−142	− 11
490		Llandrindod	8	+ 97	+ 7	7	+153	+ 14
491	106	Llandudno	159	+134	+ 12	160	+138	− 2
492		Llandyssil	39	+161	0	46	+169	− 11
493		Llanelly	53	− 49	+ 85	53	− 57	+ 83
494		Llanfair	50	+100	− 7	54	+177	− 2
495		Llanfyllin	51	+135	− 40	50	+143	− 29
496	107	Llangollen	71	+107	− 9	76	+102	− 27
497	108	Llanidloes	20	−140	− 22	11	−139	− 34
498		Longridge	16	− 57	− 14	21	− 59	+ 10
499	109	Loughborough	155	− 65	+ 22	149	− 65	− 29
500		Looe	21	+129	− 68	21	+129	− 77
501		Louth	73	+124	− 1	64	+123	+ 74
502	110	Lowestoft	61	+116	+192	74	+132	+ 76
503		Lynton	18	−142	− 63	20	−139	− 55
504*a*	111	Mablethorpe (*a*)	34	+113	+163	41	+119	+ 96
504*b*		„ (*b*)	30	+139	+142	21	+139	+208
505		Machynlleth	45	− 53	− 42	45	− 62	− 37
506		Maiden Newton	19	− 65	− 66	24	− 45	− 24
507		Maidstone	34	±180	−182	19	+168	− 99
508		Malton	102	+110	..	98	+108	..
509	112	Malvern						
509*a*	112*a*	„ Colwall Green. . .	119	−140	..	117	−141	..
509*b*	112*b*	„ Great Malvern . .	121	+127	+ 21	125	+126	− 11
509*c*	112*c*	„ Malvern Wells . .	81	+149	..	85	+147	..
509*d*	112*d*	„ Mathon	147	− 98	..	145	− 99	..
510	113	Manchester (Old Trafford) .	105	−104	− 50	99	−105	− 79
511		Mansfield	90	+174	− 7	87	+177	+ 34
512	114	Manton	70	− 18	+ 79	64	− 16	+ 11
513		Marazion	39	+125	− 83	41	+131	−113
514	115	March	36	+ 2	+111	24	+ 9	+ 31
515		Margate	69	−141	− 58	46	−127	+ 37
516		Market Bosworth	72	−145	− 88	71	−140	− 42
517		Market Drayton	134	−122	+ 10	140	−122	+ 28
518		Market Harboro'	11	+112	− 92	7	+ 63	− 37
519		Market Rasen	24	+168	+138	19	−177	+200
520		Market Weighton	140	+ 99	+249	135	+ 98	+317
521		Marlborough	162	− 88	+ 76	164	− 84	+120
522		Maryport	150	+161	−139	144	+160	−112
523		Masham	95	−149	+ 39	92	−146	+ 98
524		Matlock	33	− 39	+ 57	38	− 43	+ 91

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1. °	Z_1.	F.	ϕ. °	Z.
525	116	Melton Mowbray.	185 182	+ 85 +152	+305 + 80	189 187	+ 87 +152	+243 + 31
526		Middlewich.	70	− 40	− 12	72	− 45	+ 10
527*a*	117	Milford (*a*)	98	− 23	− 72	106	− 19	− 48
527*b*		,, (*b*)	126	− 33	− 51	124	− 35	− 51
528		Millom	39	−108	+ 58	40	−102	+ 77
529		Milnthorpe	34	+ 22	+ 29	37	+ 16	+ 57
530		Minehead	28	−111	− 23	30	−105	− 10
531		Monkswood (Usk)	43	+131	− 79	40	+136	− 61
532		Monmouth	38	+138	− 65	33	+140	− 34
533		Montgomery	72	+153	− 26	73	+157	− 9
534		Moreton Hampstead. . . .	47	+ 31	+ 2	47	+ 28	+ 5
535		Moreton-in-the-Marsh . . .	210	−114	− 43	211	−112	+ 3
536		Morpeth.	19	− 84	− 64	25	− 56	− 16
537		Moseley.	92	− 53	−100	97	− 52	− 58
538		Mullion	121	−163	+224	123	−164	+202
539		Neath	45	− 4	− 33	41	− 8	− 27
540	118	Newark	55	+ 49	+ 6	56	+ 55	− 51
541		Newbury	109	− 22	+143	122	− 20	+201
542	119	Newcastle	35	− 27	− 4	26	− 32	− 50
543		Newport (Mon.)	29	+ 59	− 28	27	+ 54	− 5
544		Newport (Salop)	186	+ 46	+ 6	181	+ 45	+ 33
545		Newport Pagnell	170	+167	− 9	156	+166	+ 64
546		New Radnor	67	+ 70	− 8	61	+ 72	+ 5
547		Newton-le-Willows	50	− 16	+ 59	51	− 20	+ 81
548		Newtown (Mont.)	84	+172	+ 11	87	+175	+ 19
549	120	Northampton	111	+165	− 69	121	+165	−132
550	121	Nottingham	33	− 27	+179	28	− 21	+135
551		Oswestry	77	+ 96	+ 24	73	+ 99	+ 29
552		Oundle	48	−158	−107	42	−149	− 43
553*a*	122	Oxford (*a*)	38	−171	+169	50	−163	+102
553*b*		,, (*b*)	142	−163	− 81	132	−162	− 25
554		Pantyffynnon	80	−140	− 16	87	−141	− 14
555		Pateley Bridge	40	− 72	+140	45	− 66	+205
556		Penrith	30	− 94	−198	32	− 81	−170
557		Penwyllt	27	+167	+ 63	27	+178	+ 65
558	123	Peterborough	52	+ 56	+150	50	+ 68	+ 75
559		Pickering	96	+125	+ 16	89	+124	+ 66
560		Plashetts	14	− 60	−124	23	− 38	− 84
561	124	Plymouth	30	+168	−210	33	+169	−208
562		Pocklington	138	+147	− 14	133	+148	+ 53
563		Point of Ayre (Isle of Man) .	159	−153	−111	156	−153	− 98
564		Pontefract	38	+133	− 96	35	+131	− 29
565		Pontrilas	110	+ 89	+ 11	107	+ 90	+ 32
566		Pontypool	33	+175	− 58	32	+173	− 38
567		Pontypridd	30	− 70	− 45	32	− 74	− 32
568	125	Port Erin	135	−134	− 55	137	−134	− 64
569		Porthallow	62	+154	−116	64	+155	−138
570		Portmadoc	159	− 26	+188	157	− 29	+195
571	126	Preston	4	− 34	+ 49	4	+ 45	+ 25

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
572	127	Purfleet	60	+111	+ 89	67	+128	+ 4
573	128	Pwllheli	125	+ 45	+114	134	+ 44	+109
574		Radstock	17	−170	− 90	13	−157	− 58
575		Ramsey (Hunts.)	46	−122	− 49	44	−107	+ 23
576	129	Ramsey (Isle of Man)	121	−150	+ 4	126	−151	− 14
577	130	Ranmore	85	+ 65	+ 11	77	+ 77	− 62
578		Ravenglass	18	−170	− 22	13	−162	+ 8
579*a*	131*a*	Reading (*a*)	49	− 8	+235	34	− 14	+171
579*b*	131*b*	„ (*b*)	84	− 10	..	70	− 13	
580*a*	132*a*	Redcar (*a*)	23	− 15	+ 11	15	− 8	− 41
580*b*	132*b*	„ (*b*)						
581		Retford	53	+ 8	+ 73	55	+ 2	+118
582		Rhayader	63	−129	+ 11	70	−130	+ 17
583		Rhyl	36	+124	−145	35	+129	−129
584		Richmond (Yorks)	88	−138	− 69	82	−131	+ 16
585		Riverhead	37	+ 40	−139	55	+ 29	− 61
586		Rochdale	125	− 95	+109	129	− 93	+143
587		Rockingham	58	+ 66	−141	61	+ 57	− 80
588*a*		Ross (*a*)	Dip only observed.					
588*b*		„ (*b*)	44	−114	− 5	46	−110	+ 21
589		Rushbury	56	−121	+ 12	60	−120	+ 32
590		Ruthin	37	+161	+ 19	40	+170	+ 32
591	133	Ryde	59	− 56	− 18	54	− 75	− 78
592	134	St. Cyres	72	+ 50	− 5	70	+ 53	− 17
593*a*	135	St. Leonards (*a*)	6	− 31	− 61	22	−156	−136
593*b*		„ (*b*)	68	−166	−230	41	−166	−148
594		St. Levan	72	+149	−149	77	+151	−180
595		St. Neots	69	−161	− 92	57	−156	− 18
596*a*	136	Salisbury (*a*)	91	− 29	+ 43	93	− 32	− 1
596*b*		„ (*b*)	68	− 90	−129	69	− 82	− 83
597		Salisbury Plain	65	− 74	− 81	69	− 64	− 33
598		Salkeld	29	+126	−164	23	+113	−127
599		Santon	112	−112	− 29	111	−111	− 17
600		Saxmundham	49	+178	− 61	24	+173	+ 49
601	137	Scarborough	47	+ 52	+ 63	49	+ 61	+ 10
602		Sedbergh	59	+162	+ 43	52	+163	+ 79
603		Sedgefield	89	−164	−116	81	−160	− 70
604		Selby	25	− 43	+ 51	32	− 46	+ 98
605		Shap	80	+170	−137	74	+171	−108
606		Sheerness	46	−174	− 31	21	±180	+ 5
607		Sheffield	126	+ 95	− 19	119	+ 95	+ 24
608		Shifnal	54	− 36	− 78	56	− 43	− 60
609		Shoreham	47	+ 36	− 75	66	+ 29	+ 8
610	138	Shrewsbury	118	−173	−319	115	−175	−342
611		Sidmouth	22	+ 90	− 90	20	+ 79	− 78
612		Silloth	47	−139	−145	40	−130	−119
613		Sittingbourne	20	−143	−134	11	− 38	− 38
614		Skipton	68	− 87	+ 41	71	− 82	+ 78
615		Sleaford	106	− 70	+ 64	113	− 69	+120
616		Snodland	33	+ 39	− 37	55	+ 27	+ 46
617		Southampton	36	− 74	−130	43	− 51	− 75

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
618	139	Southend	81	+126	+ 74	94	+139	− 21
619		Southport	20	−119	+ 75	23	−108	+102
620*a*	140	Spalding (*a*)	134	− 98	− 48	132	−102	−122
620*b*		„ (*b*)	122	− 45	− 37	145	− 49	+ 30
621		Spilsby	82	+ 83	+ 91	77	+ 79	+165
622		Stafford	34	−104	−160	39	−102	−127
623		Stalbridge	9	+126	−106	8	+ 50	− 69
624		Stamford	102	+140	−123	93	+140	− 65
625		Stanmore	44	+128	−152	37	+106	− 75
626		Stockton	54	−163	− 33	48	−156	+ 14
627	141	Stoke-on-Trent	17	+ 10	+ 85	21	+ 25	+ 54
628		Stokesley	45	+156	− 37	36	+153	+ 16
629*b*		Stonyhurst	38	− 63	− 69	42	− 62	− 32
630		Stratford-on-Avon	221	− 90	+462	224	− 89	+503
631		Strood	11	+112	− 46	22	+ 39	+ 42
632		Stroud	35	−129	+ 19	34	−120	+ 53
633		Sunderland	51	− 42	− 84	60	− 37	− 35
634	142	Sutton Bridge	55	− 51	+200	46	− 57	+115
635		Sutton-on-Derwent	76	+142	+100	72	+141	+161
636		Swanley Junction	38	+ 32	− 50	59	+ 26	+ 31
637*a*	143	Swansea (*a*)	105	+ 4	+ 30	109	+ 6	+ 26
637*b*		„ (*b*)	122	− 8	+ 32	118	− 10	+ 31
638	144	Swindon (1)	..	..	+ 38	..	..	+ 5
639		„ (2)	153	− 81	+ 90	156	− 82	+135
640		Syston	124	− 75	+ 63	131	− 73	+114
641		Tamworth	104	+168	− 35	101	+171	+ 3
642	145	Taunton	26	0	− 59	21	+ 5	− 80
643		Tavistock	45	+ 47	− 80	46	+ 44	− 81
644		Terling	83	+160	− 70	63	+151	+ 28
645		Tetbury	34	−110	+ 28	27	−163	+ 66
646		Tewkesbury	67	+173	+ 7	64	+176	+ 46
647	146	Thetford	17	− 7	+ 94	1	− 90	+ 1
648	147	Thirsk	38	+138	+173	45	+140	+125
649		Thorne	31	− 88	+ 92	36	− 84	+160
650	148	Tilney	29	− 4	+311	18	+ 3	+222
651	205	Tintern	Dip only observed.					
652		Tiverton	46	+110	− 79	43	+108	− 63
653		Towcester	111	+153	− 17	101	+150	+ 43
654		Tregaron	64	− 88	− 76	69	− 93	− 76
655		Tring	105	+142	+ 15	94	+136	+ 86
656		Truro	31	+127	− 37	33	+133	− 59
657*a*	149	Tunbridge Wells (*a*)	22	+ 95	−104	30	+146	−186
657*b*		„ „ (*b*)	18	−155	−179	18	−135	− 97
658		Ullesthorpe	89	+175	−102	84	+178	− 55
659		Ulverston	74	−114	+ 21	75	−112	+ 45
660		Uttoxeter	32	+ 60	−103	27	+ 54	− 69
661		Ventnor	32	−124	− 68	24	− 90	− 16

TABLE XXV.—Table of Disturbing Forces (continued).

England and Wales (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
662		Wadebridge	58	+ 21	− 50	52	+ 22	− 72
663		Wainfleet	33	+ 29	+ 65	38	+ 17	+142
664	150	Wallingford	26	−108	+145	33	−129	+ 86
665		Ware	50	+149	− 14	36	+134	+ 71
666		Watton	60	+155	+ 18	44	+149	+107
667		Wellington (Salop)	70	+ 57	+132	64	+ 58	+150
668		Wells (Somerset)	28	−129	− 28	27	−117	+ 4
669		Welshpool	56	+157	− 68	60	+162	− 54
670		Wem	87	−146	−180	93	−145	−162
671		Westerham	34	+ 56	−166	54	+ 37	− 86
672		Weston-super-Mare	7	+ 27	+ 2	10	+ 6	+ 24
673		Wetherby	32	+ 35	+ 59	33	+ 27	+126
674	151	Weymouth	13	±180	−144	23	180	−161
675	152	Wheelock	Dip only observed.					
676		Whitby	28	+ 42	+ 51	39	+ 18	+104
677		Whitchurch (Hants)	105	− 27	+ 25	117	− 23	+ 84
678		Whitchurch (Salop)	38	− 9	−144	36	− 19	−127
679	153	Whitehaven	42	+ 69	+ 24	42	+ 76	+ 1
680*a*		Whitewell (*a*)	32	+ 4	..	36	− 3	..
680*b*		„ (*b*)	43	− 42	−166	49	− 43	−137
681		Wickwar	99	− 80	− 57	102	− 78	− 30
682		Wigan	30	− 63	+142	34	− 66	+161
683		Wigton	34	−151	− 89	28	−141	− 62
684		Wimborne	25	−130	−117	19	− 99	− 77
685	154	Windsor	58	+104	+136	62	+119	+ 68
686	155	Wisbech	22	+ 30	+227	16	+ 60	+146
687		Woburn Sands	104	+146	+ 79	94	+141	+149
688		Wolverhampton	148	−115	−129	152	−114	− 97
689		Woodhead	19	− 78	+122	25	− 79	+161
690		Wooler	32	+ 58	− 13	44	+ 39	+ 35
691		Worcester	90	−179	− 92	88	−176	− 57
692		Worksop	10	−114	+ 2	15	− 98	+ 46
693	156	Worthing	44	+ 90	+ 24	45	+117	− 50
694		Worthington	153	− 35	− 35	157	− 36	+ 5
695		Wye	43	−117	−173	33	− 79	− 80
696		Yarmouth	53	+140	+ 30	39	+121	+147

Ireland.

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
697		Annalong	100	+ 51	+101	106	+ 49	+ 89
698*a*	157	Armagh (*a*)	25	+ 27	−158	24	+ 22	−139
698*b*		„ (*b*)	52	+ 5	0	50	+ 7	− 31
699		Athboy	97	+ 32	+ 88	96	+ 34	+ 70
700		Athenry	32	−178	+ 58	33	+173	+ 34
701	158	Athlone	59	− 81	− 68	61	− 79	− 43
702	159	Bagnalstown	38	+131	−113	34	+116	− 87
703		Ballaghaderreen	100	−155	+212	102	−157	+174
704	160	Ballina	224	−146	− 74	223	−145	− 23

TABLE XXV.—Table of Disturbing Forces (continued).

Ireland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
705		Ballinahinch	171	−127	− 100	168	−130	− 138
706		Ballinalee	110	−157	− 154	111	−158	− 182
707		Ballinamore	37	−110	+ 10	35	−114	− 17
708		Ballinasloe	5	− 37	− 94	4	+ 34	− 113
709		Ballybrophy Junction . . .	85	+ 29	− 3	83	+ 31	− 23
710		Ballybunnion	23	+ 88	+ 24	29	+110	− 23
711*a*		Ballycastle (Antrim) (*a*) . .	90	+113	+ 25	90	+113	+ 8
711*b*		,, ,, (*b*) . .	90	+ 97	..	93	+ 92	..
712		Ballycastle (Mayo)	103	−126	− 262	105	−129	− 320
713		Ballygalley Bay	42	−161	+ 9	38	−162	− 2
714*a*		Ballymena (*a*)	105	− 58	− 87	105	− 56	− 103
714*b*		,, (*b*)	184	+ 10	..	188	+ 11	..
715		South of Ballymena (1) . .	344	+ 72	− 564	347	+ 72	− 582
716		,, ,, (2) . .	787	− 78	− 763	786	− 78	− 782
717		North of ,, (1) . .	406	−157	− 259	401	−157	− 274
718		,, ,, (2) . .	515	+168	+1249	512	+167	+1233
719		Ballymoney	264	− 10	− 320	267	− 9	− 340
720		Ballymote	75	−137	− 13	76	−141	− 50
721		Ballyragget	44	+ 21	− 67	38	+ 25	− 91
722		Ballyshannon	89	+161	− 183	91	+160	− 227
723	161	Ballywilliam	104	−154	+ 45	93	−153	+ 70
724		Baltinglass	42	+ 62	− 142	40	+ 67	− 155
725		Bandon	27	+ 80	+ 9	32	+120	− 55
726	162	Bangor	68	+ 3	− 93	62	+ 2	− 90
727		Bannow	69	−115	− 5	77	−123	− 42
728*a*	163	Bantry (*a*)	39	+ 52	− 12	54	+ 31	+ 57
728*b*		,, (*b*)	77	+ 18	+ 30	56	+ 29	− 39
729		Belfast	101	+ 49	− 279	105	+ 47	− 287
730		Belmullet	89	+166	+ 29	97	+165	− 31
731		Bray	25	− 21	− 140	21	− 32	− 151
732		Broadway	45	+ 35	+ 129	33	+ 46	+ 92
733		Buncrana	64	− 41	− 24	63	− 38	− 59
734		Burncourt	23	+ 13	− 55	9	+ 32	− 104
735		Carlow	67	+ 48	− 42	64	+ 51	− 61
736		Carnlough	62	+138	+ 49	59	+134	+ 33
737		Carrickfergus	183	+ 84	− 33	185	+ 83	− 41
738*a*	164	Carrick-on-Shannon (*a*) . .	49	+ 72	− 171	48	+ 69	− 140
738*b*		,, (*b*) . .	23	+ 88	+ 19	26	+ 92	− 12
739		Castlebellingham	67	+103	+ 31	71	+101	+ 53
740		Castleblaney	137	−162	− 6	136	−163	− 26
741		Castlecomer	74	+ 43	+ 9	70	+ 47	− 15
742	165	Castlereagh	37	+107	+ 25	33	+104	+ 59
743		Castletown (Berehaven) . .	42	+ 48	− 44	39	+ 78	− 101
744	166	Cavan	68	+177	− 111	67	+179	− 87
745*a*	167	Charleville (*a*)	31	−147	− 152	20	−123	− 116
745*b*		,, (*b*)	21	+ 39	− 55	15	+ 79	− 102
746		Churchtown	39	+ 50	+ 19	31	+ 80	− 41
747	168	Clifden	183	+145	+ 37	176	+146	+ 76
748		Clonakilty	43	+ 28	+ 56	27	+ 54	− 11
749		Clones	32	+122	− 159	34	+120	− 180
750		Clonmel	5	+ 90	− 56	15	+160	− 104
751	169	Coleraine	226	−162	+ 106	230	−162	+ 134

TABLE XXV.—Table of Disturbing Forces—(continued).

Ireland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
752		Cong	87	+133	+134	93	+132	+ 99
753	170	Cookstown Junction . . .	402	− 6	−677	399	− 6	−663
754	171	Cork	52	+ 49	+ 3	68	+ 36	+ 61
755		Cromwell's Hill (1)	72	− 59	+ 1	65	− 69	− 36
756		,, ,, (2)	66	− 31	+ 38	54	− 36	+ 1
757		,, ,, (3)	101	− 4	+ 96	89	− 3	+ 59
758		,, ,, (4)	88	− 57	− 15	80	− 63	− 52
759		,, ,, (5)	68	− 30	− 83	57	− 34	−120
760		Culdaff	126	+ 15	+ 20	129	+ 16	− 16
761	172	Donegal	56	+ 63	−250	54	+ 61	−190
762		Doneraile	48	− 60	− 48	42	− 82	−105
763		Downpatrick	35	−103	−112	34	−100	−116
764		Draperstown	33	+ 79	− 51	36	+ 72	− 63
765	173	Drogheda	44	+ 33	− 14	45	+ 32	− 3
766		Dromore	146	+ 11	−557	148	+ 11	−569
767		Drumsurn	48	−141	− 47	44	−142	− 75
768	174	Dublin (Trinity College) . .	103	+ 21	−126	106	+ 20	−116
769		Dundalk	55	+ 45	− 27	57	+ 45	− 36
770		Dundrum	40	−168	−136	38	−169	−143
771		Dungannon	60	− 42	+145	58	− 39	+118
772		Dungarvan	12	+ 59	− 88	16	+153	−144
773		Dungiven	47	−138	− 12	43	−140	− 38
774		Dunkineely	21	+121	+ 28	25	+122	− 19
775		Dunleer	30	+ 63	+109	30	+ 64	+102
776		Dunloy (1)	542	+ 71	+ 45	546	+ 71	+ 31
777		,, (2)	313	− 98	−205	311	− 99	−217
778		Dunmanway	54	+ 13	+ 98	35	+ 22	+ 34
779		Eglington	20	− 92	− 51	17	− 87	− 83
780		Ennis	81	− 11	− 94	76	− 7	−119
781		Enniscorthy (1)	117	−160	− 5	128	−162	− 36
782		,, (2)	91	−173	− 59	103	−173	− 90
783*a*	175*a*	Enniskillen (*a*)	..	..	+ 14	..	..	+ 53
783*b*	175*b*	,, (*b*)	107	+160	− 78	105	+161	− 43
783*c*		,, (*c*)	77	+162	+ 69	79	+160	+ 37
784		Fermoy	17	+ 13	+ 1	4	+124	− 61
785*a*	176*a*	Galway (*a*)	386	+159	−338	382	+159	−311
785*b*	176*b*	,, (*b*)	97	+106	− 51	91	+106	− 26
786		Glencar Hotel	78	+ 23	+ 68	61	+ 34	+ 2
787		Glenfarne	39	+147	+134	42	+147	+ 90
788		Glenmore (New Ross) . . .	108	−133	− 95	115	−136	−135
789		Goragh Wood	75	+172	+ 59	75	+171	+ 81
790		Gorey	95	−155	−127	102	−158	−146
791	177	Gort	67	− 5	+ 56	69	− 10	+ 70
792		Gortin	105	− 84	+ 56	104	− 83	+ 29
793	178	Greenore	134	+ 78	− 60	133	+ 77	− 56
794		Gweedore	9	+ 49	+ 74	11	+ 63	+ 19
795		Inishowen Head	20	+ 30	− 86	24	+ 36	−115
796		Iniskeen	66	−172	+111	65	−173	+ 94

TABLE XXV.—Table of Disturbing Forces—(continued).

Ireland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
797	179	Kells	108	+ 14	+106	109	+ 14	+123
798	180	Kildare	53	+ 36	−118	56	+ 33	−102
799		Kilfree Junction	38	+162	+108	41	+160	+ 70
800		Kilkeel	93	+ 97	− 19	94	+ 96	− 24
801	181	Kilkenny	43	+ 41	− 4	50	+ 34	+ 19
802*a*	182	Killarney (*a*)	85	+ 42	− 54	100	+ 33	+ 1
802*b*		,, (*b*)	100	+ 32	+ 64	85	+ 41	− 2
803		Killenaule	54	+ 48	− 19	50	+ 55	− 52
804		Kilrea	685	−177	−829	680	−177	−852
805	183	Kilrush	29	+110	− 4	23	+ 95	+ 38
806		Kilteely (1)	657	+ 91	+ 75	659	+ 92	+ 37
807		,, (2)	24	− 60	+163	19	− 87	+125
808		,, (3)	522	− 2	+ 21	510	− 1	− 17
809		,, (4)	64	+102	−197	70	+111	−235
810		,, (5)	110	−123	+ 45	115	−129	+ 7
811		Kingscourt	92	−153	+139	92	−154	+119
812		Kinsale	42	+101	−166	50	+125	−226
813		Knocklong	58	− 16	− 3	45	− 18	− 47
814*a*		Larne (*a*)	37	+101	+ 31	37	+ 95	+ 21
814*b*		,, (*b*)	35	+135	..	33	+129	
815	184	Leenane	195	−151	−151	193	−149	−104
816		Letterkenny	38	−130	−114	35	−133	−158
817	185	Limerick	105	+ 14	− 89	113	+ 12	− 55
818		Lisburn	106	+ 98	−172	107	+ 96	−180
819	186	Lisdoonvarna	117	− 7	+100	121	− 10	+125
820	187	Lismore	36	+ 46	−135	51	+ 30	− 81
821		Little Saltee Island	146	− 84	+397	147	− 90	+354
822	188	Londonderry	24	0	−116	22	− 10	− 83
823		Loughrea	63	+119	+ 85	68	+118	+ 65
824		Louisburgh	101	− 90	+ 44	97	− 94	− 4
825		Lurgan	30	+124	− 50	31	+119	− 58
826		Macroom	29	+128	−125	46	+147	−190
827		Malahide	112	+ 16	− 3	110	+ 16	− 3
828		Mallow	35	+131	− 7	49	+126	− 60
829		Manulla Junction	23	−142	+235	25	−154	+193
830		Maum Bridge	132	−122	+196	129	−124	+164
831		Maynooth	49	+ 6	−138	45	+ 6	−158
832*a*		Midleton (*a*)	34	− 5	−130	15	− 16	−190
832*b*		,, (*b*)	22	+ 27	..	9	+ 90	
833		Miltown Malbay	62	− 45	− 41	55	− 44	− 70
834		Mitchelstown	53	+ 15	+ 54	38	+ 22	0
835		Molranney	211	−148	− 14	215	−149	− 64
836		Mount Nugent	156	−146	+ 83	156	−147	+ 61
837		Mountrath	99	+ 49	+ 74	99	+ 51	+ 56
838		Moville	6	+ 72	−167	11	+ 63	−198
839		Mullingar	74	+ 9	− 6	73	+ 12	− 23
840		Naas	48	+ 37	− 41	46	+ 41	− 55
841		Navan	64	+ 21	+ 17	63	+ 25	− 1
842		Nenagh	85	+ 5	+151	79	+ 8	+122
843		Newcastle West	75	+ 58	− 88	73	+ 68	−128
844*a*		Newry (*a*)	488	+139	+ 37	489	+139	+ 27
844*b*		,, (*b*)	452	+138	..	453	+137	

TABLE XXV.—Table of Disturbing Forces (continued).

Ireland (continued).

No. 1891.	No. 1886.	Station.	F_1.	ϕ_1.	Z_1.	F.	ϕ.	Z.
				°			°	
845		Oldcastle	36	−118	+121	34	−112	+ 98
846		Omagh	24	− 48	+ 64	24	− 38	+ 34
847	189	Oughterard	92	+130	+183	86	+131	+213
848	190	Parsonstown	8	−140	+ 48	9	−117	+ 65
849*a*		Pettigo (*a*)	111	−128	0	109	−129	− 44
849*b*		,, (*b*)	153	−132	..	151	−133	
850		Portumna	43	+128	+ 36	48	+129	+ 17
851*a*		Roscommon (*a*)	Declination only observed.					
851*b*		,, (*b*)	94	+ 36	− 49	95	+ 39	− 49
852		Shillelagh	84	−178	−116	92	−178	−140
853		Skibbereen	29	+ 16	+ 34	14	+ 54	− 25
854*a*	191	Sligo (*a*)	107	−126	− 79	108	−124	− 55
854*b*		,, (*b*)	123	−131	− 81	124	−133	−127
855		Sneem	76	+ 46	− 51	67	+ 62	−116
856		Sperrin	48	−124	+ 78	45	−124	+ 53
857		Spiddle	171	+ 35	+217	172	+ 38	+192
858	192	Strabane	45	−102	−163	48	−102	−125
859		Stradbally	63	+ 63	−106	63	+ 65	−123
860		Stranorlar	43	− 98	+ 16	41	−100	− 29
861		Street	34	−118	+121	32	−124	+106
862		Taghmon	75	−157	+ 33	88	−159	− 4
863		Templemore	70	+ 36	− 128	67	+ 41	− 155
864		Templepatrick (1)	1243	−157	+1090	1239	−157	+1076
865		,, (2)	1768	−165	+1485	1762	−165	+1471
866		Thomastown	166	+ 66	+ 1	158	+ 71	− 49
867		Thurles	84	+ 25	− 177	77	+ 29	− 208
868	193	Tipperary	38	+ 47	− 31	47	+ 35	+ 6
869		Torr Head	153	−135	+ 77	147	−134	+ 61
870*a*	194	Tralee (*a*)	Dip only observed.					
870*b*		,, (*b*)	50	+ 76	+ 3	53	+ 95	− 54
871		Tuam	46	− 12	+ 99	42	− 7	+ 68
872		Tullamore	21	+ 95	− 17	24	+102	− 33
873		Tullow	25	+ 99	− 121	26	+115	− 145
874	195	Valentia	118	+ 42	− 53	132	+ 34	0
875		,,	86	+ 23	+ 12	70	+ 35	− 55
876		Warrenpoint	252	+128	+ 34	253	+127	+ 24
877	196	Waterfoot	85	−176	+ 1	89	−175	+ 17
878	197	Waterford	18	− 98	− 118	86	− 89	− 82
879	198	Westport	174	−116	+ 196	176	−115	+ 243
880	199	Wexford	70	−134	+ 15	60	−127	+ 47
881	200	Wicklow	36	−114	− 117	32	−106	− 110
882		Youghal	32	+ 34	− 97	18	+ 68	− 163

Nomenclature and Magnetic Contour Surface.

In our previous Memoir we were anxious to prove that the conclusions based upon the Disturbing Forces were independent of the particular method by which those forces were calculated.

We therefore showed that in many cases similar conclusions could be arrived at by studying the values of the elements, when these had been merely reduced to epoch.

It is unnecessary to amplify such evidence in this paper. The agreement between the results of the two surveys is in itself sufficient to prove the validity of the methods. We shall therefore discuss the Disturbing Forces only, unless any special reason makes it desirable to refer to the actual values of the elements at any particular place.

The increasing complication of the problem under investigation has made it necessary to use very freely the nomenclature we have adopted to describe magnetic disturbances, and even in some cases to extend it.

We therefore think it desirable to prevent misconception, by stating exactly the reasons why we use this phraseology and the reservations with which its application to the theory of "underground mountains" of magnetic rock must be safeguarded.

If the magnetic state of the United Kingdom were perfectly known, a model might be constructed by raising from every point of a horizontal map a vertical ordinate proportional to the Vertical Disturbing Force. The highest points on the surface formed by the upper extremities of the ordinates would correspond to points of maximum Vertical Disturbance. The projections on the map of the curves, in which any horizontal plane cuts the surface, would be magnetic contour lines, or loci of equal Vertical Force Disturbance.

The analogy between such a surface and a model of the hills and valleys of a country would be very close, and we have freely transferred the terms which are applied to differences of height above the sea level to the differences of Vertical Force Disturbance.

As far as we are aware, no objection can be brought against the use of the analogy except the risk that it may be interpreted too literally, and that it may be imagined that the magnetic contour surface is an exact representation of the physical contour of magnetic matter near to, but below, the surface of the earth.

We have from the first made it clear that our nomenclature must not be thus interpreted. We justified it ("1890 Memoir," p. 265) as "convenient, quite apart from any theory of the cause of local magnetic forces," and we expressly called attention to the fact that "we might have called a peak (to which the lines of magnetic Disturbing Force converge) a magnetic sink, and so on, and [that], for the present, the terms we suggest may be taken as indicating merely points and lines from and to which such lines of force run."

In the first place, then, it need hardly be pointed out that all the results we have obtained might be due to, and it has been suggested that all similar results are due to, an appropriate distribution of earth currents. The mere discovery of Disturbing Forces does not of itself prove the existence of subterranean magnetic rocks.

We have given reasons, both in our earlier paper ("1890 Memoir," pp. 314–320) and in a lecture delivered by one of us before the Royal Institution ('Proc. R.I.,' February, 1892, 417), in support of the view that the theory of earth currents is far less satisfactory than the hypothesis that the disturbances are due to magnetic matter; but even if, as we believe, magnetic rocks are the chief cause of the phenomena, it is quite possible that earth currents may affect and modify the results. It is necessary, therefore, to be very cautious in drawing conclusions as to the nature of the more deeply seated causes of local disturbances.

In the next place, even if the simple hypothesis that all the phenomena are due to rocks magnetised by the earth's field, were absolutely correct, difficulties might arise in interpreting the meaning of the magnetic contour surface. Explanations of magnetic disturbances have generally been based only on the theory that there are centres of attraction or repulsion. In other words, one of the two poles of the subterranean magnetic matter has been supposed to be at an infinite distance.

One of us has, however, pointed out ('Proc. Roy. Soc.,' vol. 48, 1890, p. 523) that this theory will not suffice, if the horizontal dimensions of the magnetic rocks are large compared with the depth at which the temperature of the interior of the earth may be supposed to be so high as to deprive matter of its magnetic properties.

In that case the upper and lower surfaces of the rocks would be oppositely magnetised, and both surfaces would have to be taken into account.

If, then, a slab of magnetic rock, say a circular disk 100 miles in diameter and 12 miles thick, existed in the midst of a widespread region of non-magnetic rock, it would be surrounded by a ring-shaped district of negative Vertical Disturbing Force. This would be followed just above the edge by a smaller ring of large positive disturbance, which would diminish as the centre was approached. Hence the magnetic contour surface would be of the shape of a circular fort. A deep ditch or valley would enclose a high rampart or line of hills, surrounding a cup-shaped hollow. A hasty conclusion from the study of the Vertical Forces alone, that this was the real shape of the upper surface of the magnetic rocks, would be entirely erroneous.

Fortunately, in so simple a case as this, the Horizontal Disturbing Forces would enable us to correct the mistake. If there were a true ridge of magnetic rocks the Horizontal Forces would tend towards it, both from the inner and the outer sides. If the phenomena were due to a circular slab, the Horizontal Forces would tend to its centre, so that at points some little way within the edge, the Horizontal Disturbing Forces would be directed from a region of higher to a region of lower Vertical Disturbing Force.

Another and still more obvious caution is that it is difficult or impossible to distinguish between a gradual decrease of the magnetic permeability and a gradual increase of the distance between the magnetic rocks and the surface of the earth.

Enough has perhaps now been said to show that the form of the magnetic contour surface (which is directly deduced from our work) must be interpreted with discrimination, but, if this is clearly understood, we think that the connection between the surface phenomena and the forms of the sub-terrestrial magnetic rocks is probably sufficiently close to make a nomenclature based upon it, not only the most convenient, but also the most suggestive.

In a considerable number of cases, partly discussed in our previous Memoir, partly to be treated of hereafter, lines or centres of attraction are connected with the appearance of magnetic rocks on the surface, or with an anticlinal arrangement of the sedimentary surface rocks, which may be accompanied by a fold in the magnetic rocks below.

If approximation to the surface is the predominant cause, we should expect that the Horizontal Disturbing Forces would be directed to the regions of maximum vertical disturbance. This condition is almost universally fulfilled. There is only one region (that near Reading) where the distribution of the forces suggests an underground table or plateau of magnetic rock, as distinguished from the peaks observed elsewhere, and even there the vertical disturbances are very large in the central region.

Secondly, we think that the magnitude of the magnetic districts, which are often from 50 to 100 miles in width, suggests rather the folds of a primæval rock than changes in its nature. It is, of course, theoretically possible that a gradual increment in the percentage quantity of magnetite or of iron might continue over an equal distance, and it is a matter for geologists to decide whether it is a more probable cause than a slow change of level. On the other hand, we may remark that, although the Vertical Disturbing Forces can be explained by the existence of underground magnetic rocks, similar to those which occur on the surface, there is more difficulty in accounting for the Horizontal Disturbing Forces, unless the hidden rocks are more magnetic than those which are exposed to view.

If, however, all these cautions are borne in mind, the use of the magnetic contour surface is so convenient, that we shall borrow terms freely from topography. In general we shall prefix the word *magnetic* to emphasize the sense in which the terms are employed, but sometimes this may be superfluous.

We proved in our first survey that the Horizontal Disturbing Forces tended towards lines of maximum Vertical Disturbing Force; and, assuming this result, we may therefore use the terms *ridge* and *valley lines*, and similar expressions, in somewhat more restricted senses than heretofore. Magnetic *ridge* and *valley lines* are such that, if we cross them at right angles, we pass through a region of maximum or minimum Vertical Disturbing Force respectively. In general, Horizontal Disturbing Forces tend towards *ridge lines.*

Though, as has been shown, this is not a necessary consequence of the theory of magnetic rocks, it is so universally obeyed that stations at which the rule is departed from may, in this respect, be considered *anomalous.*

A *magnetic peak* is a point at which the vertical disturbance is a maximum, when compared with that at all neighbouring stations. It is generally a more or less powerful centre of attraction, especially if it is an isolated point of high Vertical Force. A *magnetic peak* is generally found at a point where two *ridge lines* cross.

A *magnetic col* is a point on a *ridge line* at which the Vertical Disturbing Force is a minimum as compared with that at neighbouring points on the *ridge line*. A well-marked *magnetic col* generally occurs at the crossing point of a *magnetic ridge* and *valley line*.

GENERAL RESULTS OF THE SURVEY.

Having thus explained the chief terms which we intend to use, it is desirable to indicate the nature of the additions to our previous knowledge which we should *à priori* expect to follow from a large increase in the number of places at which observations were made.

These may be summed up as follows:—

(1.) The positions of the principal magnetic ridge and valley lines would be more accurately fixed.

(2.) The details of their constitution would be more clearly defined, so that variations in the magnitude of the attractive force would be discovered, which would enable us to specify, not only the general position of the ridge line, but also to detect the existence of magnetic peaks and cols.

(3.) Minor magnetic districts more or less completely separated from the others by magnetic valley lines would be discovered.

All these results have followed, but, though their boundaries have been modified, the principal magnetic regions into which we originally divided the United Kingdom still stand out as connected wholes, and as far more important than any of the comparatively large number of minor magnetic divisions which must now be added to them. It is true that some of the latter enclose an area equal to that of two or three small counties, but they do not rank with the principal magnetic regions, in some of which a clearly-marked ridge line can be followed for nearly 200 miles.

The only important change which we are inclined to make in our published list of the chief magnetic ridge lines is rather by way of subtraction than of addition.

We previously classed the line which is connected with the great fault marked by the Caledonian Canal, and that which appeared to be related to the basalts of Skye and Mull as independent.

We are now inclined to regard the cross connection between them as so important as to make it better to regard them as parts of a complex but single whole.

In addition to the increase in our knowledge of magnetic ridge and valley lines, which are clearly indicated both by the Vertical and Horizontal Disturbing Forces, the more detailed survey has enabled us to detect minor peculiarities, which would have escaped notice in any less complete investigation.

Thus it is often possible to follow for some distance a line of maximum Vertical Disturbing Force, on which the values of the Vertical Disturbances are either absolutely small or but little exceed those at neighbouring stations. Such lines may exert comparatively little effect on the Horizontal Disturbing Forces, but they are often found to connect regions of high Vertical Force, which would otherwise appear entirely isolated, and to explain apparent anomalies in the directions of the Horizontal Forces. The magnetic phenomena which they exhibit are such as would be produced by vertical dyke-like sheets of magnetic matter, of which the horizontal thickness was small, compared with either the horizontal length or the depth. Such vertical laminæ would produce greater effects upon the Vertical than upon the Horizontal Force. The two vertical faces would be oppositely magnetised and would largely neutralize each other's effects. The lower horizontal face being narrow might be neglected. The upper horizontal face would, therefore, be the most important. For the purpose of illustration let it be regarded as an infinite straight line at a depth d below the surface. The Vertical and Horizontal Disturbing Forces would be equal and the latter would be a maximum at points on the surface at a distance d from that vertically above the line. Let them at that point be equal to 0·00030 C.G.S. unit, *i.e.*, to the limit of the accurate determination of the direction of the Horizontal Disturbance.

Under these conditions the Horizontal Disturbance would everywhere else be less than that limit, and thus the disturbing cause would not produce any clearly marked effect on the Horizontal Forces. On the other hand, throughout a strip, the breadth of which was equal to twice the depth of the disturbing line, the Vertical Disturbance would vary between 0·00030 and 0·00060 C.G.S. unit. The larger of these quantities is nearly double, the smaller is about equal to the average error of the determinations of the Vertical Force Disturbance.

Hence the effect of the line on the Vertical Force would be detected, while the Disturbance of the Horizontal Force would probably escape notice. The result would be still more likely to follow if the line ran through a region subject to other disturbances, due to more distant but more powerful centres of attraction. These might give to the Horizontal Forces directions altogether independent of the minor ridge, the existence of which might nevertheless be traced by a clearly marked, though comparatively unimportant line of relative maxima of the Vertical Disturbances. Such lines may be regarded as secondary ridge lines. They connect all the principal magnetic districts, and generally so clearly and simply that we cannot but believe that they are the less conspicuous parts of the magnetic system, of which the more prominent features were discovered in our earlier work.

The plan which we have adopted in working up our results has been as follows:—

First the ridge and valley lines were drawn in Map 12, as far as possible by the aid of the Vertical Disturbing Forces alone. The lines of maximum and minimum Disturbance are often so clearly marked that no possible doubt can arise. Sometimes, but comparatively seldom, it was necessary to consult the Horizontal Disturbing

Forces. The valley lines were then transferred without change to Map 13, on which the directions of the Horizontal Disturbing Forces are shown. The ridge lines were also transferred to Map 13, but were there drawn shifted from the stations through which the Vertical Force Ridge passed towards the side to which the Horizontal Disturbing Force at each station pointed.

The Horizontal confirm the Vertical Disturbances if, at the next station on the side towards which the ridge line is shifted, the arrow points in the opposite direction to that at the station from which it is shifted, a centre of attraction being thus indicated between them.

These ridge lines are drawn freehand in Map 13, and we only profess to have fixed their positions as somewhere between the nearest stations on either side.

The arrows show the directions of the Horizontal Disturbing Forces. They are coloured red or blue according as the Vertical Force Disturbance is positive or negative. When the Horizontal Disturbing Force is below the limit of the accurate determination of direction, its magnitude is given on the map in terms of 0·0001 metric unit.

MAGNETIC DISTRICTS OF THE UNITED KINGDOM.

1. *The Great Glen, or Caledonian Canal District.*

The neighbourhood of the geological fault marked by the great Glen, along which runs the Caledonian Canal, is distinguished by high Vertical Forces. That this ridge line is prolonged to the north of Inverness, nearly in the line of the Glen, is shown by the high Vertical Forces at Wick and at Helmsdale, and by the directions of the Horizontal Disturbing Forces at those places, and at Tain, Forres, Dingwall, and Inverness. Both surveys and, we may add, our deductions from Mr. WELSH'S Survey of Scotland (1857–58), agree in placing the ridge lines near to, but a little to the west of the Great Glen near Ben Nevis (Banavie). All three surveys are also in accord as to the fact that further north the ridge line is to the east of the Glen (*cf.* "1890 Memoir," Plate 13). Thus the directions of the Horizontal Disturbing Forces at Fort Augustus and Temple (Urquhart) point to the east.

We believe that the most probable cause of this deviation from the line of the Glen is that the ridge is intersected by another which crosses it between Fort Augustus and Temple (Urquhart), and connects it on the one hand with the basalts of Skye, and on the other with a very definite ridge line, which we had previously discovered near Elgin.

The Vertical Disturbing Forces (see Map 12) are unquestionably in accord with this view.

The two lines of maximum Vertical Disturbance are remarkably clear.

The evidence thus obtained is not weakened by the Horizontal Disturbing Forces, but, as we should expect, the ridge lines show a tendency to break up into peaks, and in some cases, the physical importance of the intervening valleys is doubtful.

Thus, if we trace the line from the east, we find a clearly marked ridge running north and south, near Elgin. The low Vertical Force at Forres indicates the magnetic valley which divides it from the prolongation of the main line of the Great Glen. The ridge line, as drawn from the Vertical Force Disturbances, after running south for some 20 miles, trends to the west, towards the Boat of Garten. This change of direction is made still more evident by the Horizontal Disturbing Forces, which at six stations to the south of the ridge point nearly due north. From the Boat of Garten, the locus of Maximum Vertical Force Disturbance is continued through Temple (Urquhart), Glen Afric, and Loch Duich to the stations in Skye; but, whereas the Horizontal Disturbing Forces at the two first-named places tend towards or to the east of the line of the Caledonian Canal, the centre of attraction which mainly affects Loch Duich is to the west of that station.

Hence, if the Skye and north Caledonian Canal Stations are to be regarded as lying on the same ridge line, they must be considered as peaks.

The key to the magnetic constitution of this part of Scotland seems to be the fact that Fort Augustus is a magnetic col. This was clearly shown in our earlier paper, the Vertical Disturbing Force at that station, though high, being less than at Inverness to the north, or Banavie to the south ("1890 Memoir," Plate 13). A station has now been interposed between Fort Augustus and each of these places. Temple (Urquhart) is about half way from Fort Augustus to Inverness, and Loch Lochy about half way to Banavie. At both these stations the Vertical Force Disturbance is greater than at Fort Augustus, so that the position of the magnetic col is fixed more definitely than before as being in the immediate neighbourhood of that place.

A clearly marked valley line of Minimum Vertical Disturbing Force runs from Pitlochrie to Fort Augustus. It is, however, only of secondary rank, as it does not form part of a boundary which completely encloses a region of high Vertical Force, but crosses such a region at Fort Augustus. This line is prolonged to Glen Afric, at which place, though the Vertical Disturbing Force is as large as + 98 (*i.e.*, 0·0098 metric unit), it is less than at Temple (Urquhart) on the one side (110), and than at Loch Duich (158) on the other.

From Glen Afric it proceeds to Achnashellach, where it joins a main valley line. The importance of this secondary line from Fort Augustus to Achnashellach would be much enhanced if a region of very low Vertical Force were discovered between Glen Afric and Loch Duich. In that event, a complete separation would be effected between the Skye and Great Glen districts. As it is, we have no choice but to follow the indications afforded by the Vertical Force, which are clearly in closest accord with the view that a continuous ridge line connects these regions. This view is also supported by the clear indications of a parallel secondary valley line running from Mallaig (L. Nevis) to Fort Augustus, and thus meeting that which runs from Pitlochrie to the same place. This valley line may be regarded as dividing the Caledonian Canal District into two sub-districts, in the southern of which the ridge of the Caledonian Canal is predominant and is finally connected with the basalts of Mull, while in the northern region its effects are complicated by its intersection with another line, which connects it with the basalts of Skye on the one side, and with the well-defined Elgin centre on the other.

Pursuing the course of this transverse ridge line eastwards from Loch Duich, we find that it traverses Skye. The investigation of so highly disturbed a region is full of difficulties, and observations made at Portree ("1890 Memoir," p. 123) prove that on the basalt itself the local overpower the regional attractions. There are, however, places on the shores of Skye and on neighbouring islands at which it is possible to plant the tripod on patches of Jurassic or Silurian rocks. These we have selected for our stations, and in consequence of this precaution, the results are fairly concordant.

In the first place they indicate a region of very high Vertical Force between Balmeanach and Broadford, towards which the Horizontal Disturbing Forces point east from Balmeanach and Loch Sligachan, south from Broadford and a number of neighbouring places, and north from L. Slapin. Though the Vertical Disturbances are very great, reaching 0·1 metric, or 0·01 C.G.S. unit at Balmeanach, the region of high Vertical Force is very narrow, stations of powerful negative Disturbance bordering it closely both on the south and north. The southern valley is itself very narrow, and separates the ridge from the basalts of Canna and Eigg, towards which tend the Horizontal Disturbing Forces on the valley line stations, such as Soa and Ord. The Horizontal Disturbing Forces at Ornsay and Sandag Bay indicate a peak to the south of these stations. It may be questioned whether this is an outlier, but if not, the ridge line is curved, as shown in Map 13.

The distribution of the Vertical and Horizontal Forces at Loch Bay and in the Hebrides suggests that the ridge line we are tracing passes westward from Balmeanach across the Minch. It might be urged that if the ridge runs to the Hebrides as we have shown, the Horizontal Force at West Loch Tarbert ought to be directed towards it. Inasmuch, however, as its magnitude is only 0·0004 metric or 0·00004 C.G.S. unit, which is less than the average difference between two independent experiments, we know practically nothing of its direction. L. Staffin appears to be an anomalous station.

On the whole then, in spite of some doubt as to the minute constitution of some of its parts, we think that the fact that a region of high Vertical Force runs across Scotland, from the Hebrides to Skye, Loch Ness and Elgin, is proved, and that the apparent divergence of the Great Glen magnetic ridge from the line of the fault is due to the complications introduced by its intersection with this important cross range.

Passing next to the southern part of the Caledonian Canal ridge, we find that it runs near to but a little to the west of the line of the Canal. It passes between Kinloch Eil and Camas-nan-Gall. As these stations are only about six miles apart, its position at this point is very accurately known.

The Vertical Forces at all the stations near Ben Nevis and Loch Eil are very high and this centre dominates the district as far south as Kinloch Aline on the Sound of Mull.

The directions of the Horizontal Disturbing Force at Salen and Loch Nevis suggest a westerly extension of this region. However this may be, the ridge line, as deduced from the Vertical Forces, passes through Kinloch Aline, and thence, through Scarnish, westwards.[*] It would be impossible to trace this line in detail across the basalts of the north of Mull, and it is probable that we know relatively little of the magnetic characteristics of the district (largely composed of sea) which lies between, and to the west of, the south of Skye and the south of Mull. There is, however, very strong evidence in favour of the existence of an important peak under the sea to the south of the Hebrides.

We pointed out that this was probable in our previous paper ("1890 Memoir," pp. 300 and 302).

Loch Boisdale was at that time our most southerly station in the Hebrides, and the Vertical Force at that place was very low. If our surmise were correct, the Vertical Forces ought to increase, and the Horizontal Disturbing Forces to point more directly south as we pass southwards from Loch Boisdale towards the assumed centre of disturbance. Dr. THORPE, therefore, made observations at Castle Bay, Barra, and on Bernera, the most southerly of the Hebridean group. Our forecast was completely justified. The Vertical Disturbing Force increased (algebraically) from $-$ 0·0688 metric unit at Loch Boisdale to $-$ 0·0209 at Barra and $+$ 0·0376 at Bernera, while, at the latter place, the direction of the Horizontal Disturbing Force is due south. A brief account of this result has already been given to the Royal Society ('Proc. Roy. Soc.,' vol. 47, 1890, p. 443). The Horizontal Disturbing Forces at four stations on Islay and Jura point to the west, and it may well be that this is in fact due to the influence of the attractive centre south of Bernera. That there is also a more local centre is now however proved by the fact that the Horizontal Disturbing Force in the neighbouring island of Oronsay acts in a southerly direction.

Loch Gair and Loch Melfort are stations of minimum Vertical Disturbing Force, and the line which joins them partially separates the regions dominated by the Mull ridge line and by the Islay centre respectively. As so much of the intervening space is covered by the sea, it is difficult to settle the exact relations between these, but it is noticeable that the peak, which must be somewhere between Islay and Oronsay, is almost in the prolongation of the line of the Great Glen.

DISTRICTS 2 AND 3.—*Cape Wrath and Loch Broome.*

On the north-west of the Great Glen District there are two sub-districts which may be named after Cape Wrath and Loch Broome respectively.

In the first of these there are two stations of high Vertical Force at Loch Eriboll and Forsinard. The Horizontal Disturbing Force at Loch Eriboll points northwards, while from Forsinard it tends to the west. Hence the ridge line runs north of Loch Eriboll and probably near to Forsinard itself. This latter surmise is strongly supported by the directions of the Horizontal Disturbing Forces at Altnabreac and Kinbrace. These places are only about twelve miles apart, but the Horizontal Disturbing Forces tend in opposite directions towards the ridge line just described.

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[*] We neglect the observation at Canna as that island is the seat of violent local disturbances.

A well marked attraction northwards is also exhibited at three stations on or near the valley line which bounds this district on the south.

Altnabreac is, however, the only place at which a southerly attraction towards the ridge line is indicated. Even at Bettyhill, which is very near the ridge line, as we have drawn it, the Horizontal Disturbing Force is directed away from it. It is, therefore, possible that the ridge line may not be clearly marked in that neighbourhood.

The connection of the Cape Wrath Sub-District with the north of the Hebrides is suggested, but is certainly not proved.

The chief feature in the Loch Broome Sub-District is the region of high Vertical Force indicated by the results at Scoraig, Ullapool, and Braemore. A general attraction towards this centre is exhibited at neighbouring places, but the exact form of the ridge line is doubtful. At Overscaig in the north the Vertical Force is high, but the Horizontal Disturbing Force points north, away from Loch Broome. As the direction of the Horizontal Disturbing Force at a point of maximum Vertical Disturbing Force is indeterminate ("1890 Memoir," p. 293), it is possible that the short ridge line which we have drawn curves northwards to Overscaig, and the directions of the Horizontal Disturbing Forces at the station on Loch Shin support this view.

The connection of this district with the south of Lewis is very doubtful.

DISTRICTS 4 AND 5.—*North and South Aberdeenshire.*

The Great Glen District is bounded on the north-east by two sub-districts, with the more northerly of which it appears to be in connection. The valley line between them is marked approximately by the River Dee.

We tried to fix the points at which the ridge lines intersect the east coast by running a chain of stations north and south of Aberdeen.

Thus, between Aberdeen and Ellon, which are only about 15 miles apart, we interpolated three stations, numbered respectively as 2, 3, and 4. The middle station (3) was near Belhelvie. It showed a well-marked maximum of Vertical Disturbing Force and the Horizontal Disturbing Forces at the two more northerly stations (Ellon and (2)), and at the station to the south all tended towards it.

Directly to the west of this centre are three stations of high Vertical Force. The disturbance is a maximum at Inverurie, and the Horizontal Disturbing Forces at Inverurie and Kennethmont indicate a peak to the west of the former and south of the latter place. The magnitude of the Horizontal Disturbing Force, at Alford, is only 0·00017 C.G.S. unit, and its direction may therefore be disregarded. If the line which joins Belhelvie (3) to Inverurie be prolonged it passes close to Cabrach. The Horizontal Disturbing Force at this place is not directed to the neighbouring Elgin ridge line, but southward, as though the North Aberdeenshire magnetic ridge passed close to it. This view is strongly supported by the fact that the Vertical Disturbing Force at Cabrach is a maximum relatively to the two nearest stations on the same valley line. The values of the Vertical Disturbances at the three stations (expressed in 0·0001 metric unit) are Huntly, − 147; Cabrach, − 17; Cock Bridge, − 146. On the other hand, at the nearest station on the Elgin ridge line, viz., Dufftown, the Vertical Disturbing Force is a high *maximum*, being + 314 as against + 34 at Buckie, and + 15 at Ballindalloch.

We cannot but regard this district as presenting a very satisfactory example of the remarkable agreement between the minor indications afforded by our observations.

The direction of the Horizontal Disturbing Force is abnormal at one station only (Alford), and there its magnitude is so small that the discrepancy is of no importance. The occurrence of a "col," at the point where the other evidence shows that a ridge line and valley line intersect, and of a peak at the point where the two ridge lines meet, are also remarkable confirmations of the view that, although the North Aberdeenshire and Elgin Districts are separated by a well-defined valley line which never passes over a region of great Vertical Disturbance, they are nevertheless in magnetic connection.

The valley line which separates the North and South Aberdeenshire Districts is probably a continuation of that which runs from Forres towards Ballindalloch. Of the two districts the southern appears to be the less important. The Vertical Disturbing Force, though a local maximum at Cairn O'Mount, is small (− 2) at that place, but the Horizontal Disturbing Forces there, and at the three nearest stations, prove that a centre of attraction is not far distant. The chain of stations run along the coast southwards from Aberdeen gave somewhat doubtful results. There is a well-marked maximum of Vertical Force at Station (6) (the second southwards from Aberdeen), but there is also a less important maximum at Stonehaven itself, and the Horizontal Disturbing Force at the intermediate station (7) points to this. Putting (7) on one side, the facts fit best with the hypothesis of a weak locus of attraction running a little north of (6), and of Cairn O'Mount, though the result at (7), and the general aspect of the arrows which represent the Horizontal Disturbing Forces, make it possible that in this region there are a number of unimportant and, more or less, isolated centres of attraction.

DISTRICT 6.—*Crieff.*

This is a much more important district than the preceding, but it also shows signs of the comparative complication, which is one of the characteristics of a minor magnetic region. A clearly-marked ridge line runs a little to the north-west of Callander and Crieff, and a little to the south-east of Dunkeld. Our last survey left us in some doubt as to the exact relation of Crieff to the surrounding magnetic districts. Additional stations in the neighbourhood have now completely cleared the matter up. The Crieff region of high Vertical Force is not only, as we surmised, separated by a valley line from the Great Glen District, but, as the direction of the Horizontal Disturbing Force at Crieff suggested, it is also independent of the important Scotch Coalfield District on the other side.

The prolongation of the Crieff ridge line eastwards is not made obvious by the Vertical Forces alone. The Horizontal Disturbing Forces, however, clearly support the view that a narrow attractive region runs E.N.E. from Dunkeld, then bends nearly due east, and finally enters the sea between Bervie and Montrose.

If this is so, the district contains a secondary ridge line which runs from a point between Montrose and Arbroath, nearly parallel to the first. Dundee is a magnetic col, the Vertical Disturbing Force being − 23 as against − 132 at Perth, and − 60 at St. Andrews.

Immediately on the other side of the valley line there are high Vertical Forces at Kinross and Cupar, with clear indications that a centre of attraction lies between them. This appears to be a peak in a region of high Vertical Force, and to be separated by a very slightly-marked secondary valley line from the important ridge line which traverses it further to the south. This peak is connected by a magnetic col between Perth and Dundee with the Arbroath ridge line.

DISTRICT 7.—*The Scotch Coal Field and the Cheviots.*

We now come to a district of the first rank, which, although comprising several centres, appears to be a connected whole extending from the Tees to the Tay, and from Cantyre to the coast of Northumberland.

The main feature of this region, as delineated after our earlier survey ("1890 Memoir," Plate 13), was a ridge line from the neighbourhood of Edinburgh to Arran, intersected by a clearly-marked col near Glasgow. This result has been completely confirmed, and the position of the ridge has been determined at six points within narrow limits and with far greater accuracy than we had previously attained.

Thus in 1890 we placed it between two chains of stations, of which the northern comprised Dundee, Edinburgh, Stirling, Glasgow, and Cumbrae, while the southern consisted of Berwick, Hawick, Carstairs, and Ayr. These lines run about 30 miles apart, except at their easterly terminations, where the distance from Berwick to Dundee is more than 60 miles.

We have now fixed the position of the easterly half of the line between three pairs of high level stations, viz., Berwick and Grant's House (13 miles apart), Edinburgh and Leadburn (11), and Falkirk and Whitburn (10).

The existence of a magnetic col near Glasgow is proved by the low Vertical Force at Hamilton, while, as the Horizontal Disturbing Forces at these two places point in almost exactly opposite directions, there is no doubt the ridge line passes between them. They are 11 miles apart. Further to the west the line is traced between Cumbrae and Ardrossan (11 miles), both of which are again stations of high Vertical Force, and on Arran between Loch Ranza and Brodick (9 miles).

The average distance of these pairs of stations being 11 miles, the position of this ridge line is known at six points to within 6 miles.

Again: the extension north of the Forth of the regions of high vertical force previously proved to exist near Edinburgh and Berwick was, at the conclusion of our earlier survey, very hypothetical. It was based largely upon the existence of a considerable Vertical Force disturbance at Crieff, at which, however, on this hypothesis, the direction of the Horizontal Disturbing Force was anomalous, as it pointed towards a valley line ("1890 Memoir," pp. 301, 310, and 312). The difficulty has now been cleared up. The existence of a ridge line near Crieff has been proved at Callander, Killin, and Dunkeld.

The fact that there are also large Vertical Forces in the Fifeshire District is proved at Kinross and Cupar. This high level region is completely separated from the Crieff District by a very clearly-marked valley line, which runs from Stirling to Perth and Dundee, but is connected with the main Scotch Coal Field ridge line by a high level magnetic col at Kirkcaldy, so that it must be considered as an outlier of the district to the south of it.

The secondary valley line which intersects the main ridge line at the Glasgow magnetic col runs from the top of Loch Goil to the mouth of the Clyde, and follows the course of that river as far as Abington, *i.e.*, for more than 50 miles.

We next come to two points on which our recent observations have done more than confirm and make more definite the conclusions drawn from our earlier survey.

In the first place, we have now proved the existence of a centre of attraction near the Cheviot Hills. (See also p. 654 below.)

At Jedburgh, Wooler, and Kelso the Vertical Disturbing Force is large, at Kelso larger than at any other place within 130 miles.

At Selkirk, although the Vertical Force is not large, the disturbance is greater than at neighbouring places; but the ridge line apparently dies out to the north of that town.

This centre is partly separated from the main ridge line to the north of it by a secondary valley line, which starts from Hawick, passes *viâ* Peebles to Greenlaw, and then, crossing the main ridge by a high-level magnetic col at Grant's House, joins the valley line which comes from the north to Dunbar.

The fact that the two ridge lines are very near together at Berwick, and that, as the valley line crosses the main ridge, it is only of secondary importance, is evidence that the Cheviot magnetic district is connected with that which lies to the north of it. It may be remarked that the directions of the Horizontal Disturbing Forces at Earlston and Greenlaw are more or less anomalous. At the former place the arrow points directly away from the neighbouring ridge line and towards a valley line. At Greenlaw it points away from the nearest high-level stations. It is, therefore, satisfactory to observe that in these, as in so many other cases, the anomalies occur at places where the Horizontal Disturbing Force is so small that its direction cannot be determined with accuracy.

Its magnitude is only 0·0024 metric or 0·00024 C.G.S. unit at Greenlaw, and only 0·00011 C.G.S. unit (or about half the average error of two independent experiments) at Earlston.

South of the Cheviots a fairly clear valley line runs from Bellingham to Alnmouth, which may, perhaps, be the true boundary of the Scotch Coal Field and Cheviot Disturbances. In the case of all the principal valley lines, however, the Horizontal Disturbances at most of the places through which they pass point straight away from the valley. In this case no such sudden change of direction is observed. The Horizontal Disturbing Forces point north on both sides of the valley, though, to the south of it, they begin to swerve to the east. The Bellingham-Alnmouth line must therefore be considered as only of secondary importance, and, as we have already said, there is no clear breach of magnetic continuity from Dundee to Redcar, *i.e.*, from the Tay to the Tees.

The main valley line is indeed prolonged southwards from Redcar in a very remarkable way. It can be clearly traced running nearly parallel to the Yorkshire coast as far as Great Driffield, whence it no doubt passes eastwards towards the sea.

The directions of the Horizontal Disturbing Forces at Durham, Redcar, and Whitby seem to indicate a centre of attraction off the Durham coast.

The enormous extension of this district southwards has led us a long way from the Scotch Coal Field, to which we must now return.

The second principal new fact which has come to light with respect to it is a centre of very powerful Disturbing Forces at Newmilns. The Horizontal Disturbing Force points southwards and thus indicates that Newmilns is to the north of the true focus.

Had it not been for this fact, it would have seemed most probable that the ridge passed in nearly a straight line about six miles south of Falkirk, Glasgow, and Cumbrae respectively. It is possible that it does, and that Newmilns is only subject to a powerful local disturbance. The facts, however, which makes us for the present adopt the contrary view are that New Cumnock, on the valley line, just south of Newmilns is near a col, the Vertical Disturbance being − 87 as against − 105 at Abington and − 138 at Loch Doon.

It is true that this is not a very clear indication, the difference between New Cumnock and Abington being well within the limits of the error of experiment, but it is supported by the fact that the direction of the Horizontal Disturbing Force at New

Cumnock would be explained if there were a locus of attraction a little to the east of that place.

The minor ridge line passes near Sanquhar, and is found further to the south near Lockerbie and Auldgirth. It therefore probably crosses the more important line indicated in this district, and the Horizontal Forces give evidence of a peak between Thornhill and Moffat.

Curiously enough this ridge line—though always maintaining its secondary character—can be traced as a locus of maximum Vertical Disturbing Force to the English Lakes, where it again becomes important, and, taking this fact into account, we think that its existence just south of Newmilns is practically certain.

There is also some reason to think that the ridge line which runs to Newmilns from Glasgow is itself prolonged beyond the former place. The Vertical Forces at Penwherry and Pinvalley, in South Ayrshire, prove that a ridge line must run just north of those places. There is no direct evidence that it runs to Newmilns, but it is in the prolongation of the Glasgow-Newmilns line, and the direction of the Horizontal Disturbing Force at Loch Doon accords with the hypothesis that it passes near that place.

On the whole, therefore, it appears most likely that the east and west branches of the ridge line curve south between Glasgow and Ardrossan, meet and produce a great local disturbance near Newmilns, and that the two branches, though much weakened, are continued into the next district.

To the west of Arran, the ridge line evidently turns south and runs parallel to the valley line in Cantyre.

DISTRICT 8.—*Galloway.*

We now come to the last of the Scotch Districts. It is one of the most important of the minor magnetic regions, and its principal characteristics have been entirely discovered since the publication of our earlier paper.

Large Horizontal Disturbing Forces are one of the characteristics of the north of Scotland.

We have now reached a district in which the Forces are smaller and are indeed often below the limit of accurate determination of direction. It is, however, very remarkable how well the results at such stations agree with the more trustworthy conclusions drawn from neighbouring places. It is, practically, only at such stations that difficulties of interpretation occur, but the great majority of them give useful information. A clearly marked ridge line runs from Elvanfoot to Newton Stewart, and its prolongation to the west of the latter place is proved by the equally clear valley line which passes through Stranraer. Elvanfoot is a maximum of Vertical Disturbing Force, and is near a centre to which tend the Horizontal Disturbing Forces from a number of stations in the neighbourhood.

This is interesting, because, as has been already pointed out, it is near to this point that the Galloway ridge line is crossed by the secondary line which runs from Ayrshire to the English Lakes.

The Galloway line, clearly marked by secondary maxima of Vertical Force, is prolonged into the Scotch Coal Field District, as may be best seen by aid of Map 12. Its effect on the Horizontal Forces is negligible when compared with that of the main Scotch Coal Field line, but it can be traced to the north of the latter. It thus forms a continuous, though, in some parts, a weak chain of magnetic connection between Galloway and Forfar.

Returning to Wigtonshire, the arrows drawn from the valley line, which passes through Stranraer, all point straight at the ridge line to the south ; but, on the other side of the line, there is some confusion. At three stations, Whithorn, Kirkcudbright, and Castle Douglas, the Horizontal Forces point—as we should expect—north, but at Wigtown and Parton, which are nearer to the ridge line, the Horizontal Disturbance acts parallel to or directly away from the ridge line. These stations, therefore, appear to be anomalous. There is little difficulty in explaining this. At Wigtown the magnitude of the Horizontal Disturbing Force is 0·00022 C.G.S. unit; at Parton it is 0·00031. Hence, at one place it is less than, and at the other practically equal to the limit, below which considerable errors of direction are likely to occur. The same statement holds good of Kirkcudbright and Castle Douglas, while at Whithorn the force, though larger, is still small (0·00056 C.G.S. unit). Hence there would be no reason for surprise if there were some discrepancies. As a matter of fact, however, the Vertical Disturbing Force is a little greater (algebraically) at Whithorn and Castle Douglas than at Wigtown and Parton. The difference is less than the possible error of experiment, but it occurs twice over, and suggests the possible existence of a minor ridge line parallel to the chief one and passing near these places. If this were so, the anomalies at Wigtown and Parton would be accounted for, but we cannot insist on an explanation, which, in view of the small Horizontal Disturbances, is hardly needed, and itself depends on differences too small to be trustworthy.

DISTRICT 9.—*The English Lakes.*

This district, though not large, is complicated. Two stations in the centre, viz. : Keswick and Hesket Newmarket are places of moderately high Vertical Force, and the directions of the arrows prove that the centre of attraction is between them.

They lie on a continuation of the weak ridge line, which crosses the Galloway district from north to south, and appears to enter the next district to the south of the English Lakes in Eskdale. The evidence on this last point is doubtful, as the Eskdale stations are not a mile apart, and the Horizontal Disturbing Forces at both are very small. There are also suggestions that another ridge line crosses the district from east to west.

The Vertical Force does not indeed indicate it, but the directions of the Horizontal

Disturbing Forces would be explained in several cases if we suppose that a very narrow ridge line runs from the south of Maryport to the north of Armathwaite. A prolongation of this line would also account for the Horizontal Disturbances at Alston and Haltwhistle, and for the local maximum of Vertical Force at Morpeth.

The direction of the Horizontal Disturbing Force at Ravenglass is anomalous, but it is so small that this need excite no surprise.

DISTRICT 10.—*Lincolnshire and Yorkshire.*

The next magnetic district is one of the most important. It was clearly indicated in the Maps of our previous survey as extending from the Wash to the neighbourhood of the English Lakes. It was also described as possibly throwing out a branch towards Wales. A centre of attraction was shown to be probable in the neighbourhood of the Derbyshire Peak. A second centre was discovered near Melton Mowbray, and finally it was suggested that the main ridge line was connected with the magnetic disturbances in the South of England by a less important continuation which passed near Cambridge.

It is satisfactory to be able to state that all the more doubtful points in this description have now been verified, and further that the various parts of this complex system of magnetic disturbances are so closely related that it is difficult to find clearly-defined minor valley lines to separate them. For convenience of description the district may be confined to the neighbourhood of the great ridge line which runs from Morecambe Bay to the Wash, but it will be seen that if thus defined the southern boundary is at one point quite arbitrary.

The places between which the ridge line was previously detected were Appleby and Giggleswick, Thirsk and Leeds, Hull and Gainsborough, Mablethorpe and Lincoln, Clenchwarton and Spalding, and perhaps Thetford and March.

The average distance between the two stations in each of these pairs is about 30 miles.

The line is now more accurately fixed as running between

Kendal and Milnthorpe, which are . . .	7	miles	apart.
Sedbergh and Kirkby Lonsdale, which are	10	,,	,,
Aysgarth and Kettlewell, which are. . .	11	,,	,,
Boroughbridge and Harrogate,[*] which are	6	,,	,,
Sutton-on-Derwent and Selby, which are .	11	,,	,,
Howden and Selby, which are	9	,,	,,
Brigg and Gainsborough, which are . . .	16	,,	,,
Market Rasen and Lincoln, which are . .	15	,,	,,
Horncastle and Lincoln, which are . . .	19	,,	,,
Boston and Sleaford, which are	17	,,	,,

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[*] The Horizontal Disturbing Force at Harrogate is so small that some doubt may exist as to this. Probably the ridge line runs through or close to Harrogate itself.

Thus ten points, which are on the average about 16 miles apart, are found between pairs of places, the average distance between which is 12 miles, so that the mean error will not exceed ± 6 miles.

It is also evident from the direction of the arrows at Thorne, Butterwick-on-Trent, and Barton-on-Humber, that there is a centre of attraction to the east of the first and to the north of the second place. At its extreme west end, near Barrow, the ridge line under discussion meets that from the Lake District, which deflects it to the north. A well-defined valley line runs from Barrow to Giggleswick. On the opposite side of the ridge line is a station of low Vertical Force (Aysgarth), and, though there is no further evidence that the valley line crosses the ridge, the part of the ridge to the west of Aysgarth may be regarded as a separate section. In this neighbourhood the region of high Vertical Force is very narrow, and indeed its existence has only been directly proved during our recent work.

In our previous paper a narrow region of low Vertical Force was shown in Plate 13 as joining Manchester and Appleby, the connecting station being Stonyhurst.

At that time we had only the record of the Stonyhurst observatory at our disposal, which had not been reduced to our survey standard by direct comparison with our instruments. We have since been allowed by the courtesy of the Rev. Father SIDGREAVES to make observations at Stonyhurst, with the result that the Vertical Disturbing Force comes out a small instead of a large negative quantity. This is a striking example of the necessity of direct comparison between the instruments used, if accurate results are to be obtained.

Apart, however, from the magnitude of the Disturbances at Stonyhurst, the main ridge line has now been traced across the supposed magnetic valley, and the regions of low Vertical Force to the north and south of it respectively have been clearly separated by a line of stations of positive Vertical Disturbing Force. It will, however, be observed that the Horizontal Disturbances at the coast stations are directed east, and it is therefore probable that the line we are discussing is not continued under the sea, but turns northwards towards the English lakes, though a spur may project southwards from near Kendal.

To the east of the line which joins the low Vertical Force Stations, Giggleswick and Aysgarth, the Vertical Disturbing Forces increase rapidly, reaching a maximum at Harrogate, near to which is a focus or centre of attraction.

At this point the ridge is crossed by another, which can be clearly traced by means of the Vertical Disturbing Forces from Pickering in the East Riding, to Rochdale in Lancashire.

The Horizontal Forces show that it runs to the east of the latter place, but to trace it further, at present, would lead us away from the main ridge line. We have, therefore, taken advantage of some very faint indications of a line of relatively low Vertical Force, running from Leeds to Stonyhurst, to separate—for the purposes of discussion—the regions to the north and south of it. But as the physical reality of this line is very doubtful, we have drawn on Map 12 an almost arbitrary line to serve as an artificial boundary, and have marked it by crosses.

A valley line, which is very clearly marked, runs south from Leeds to Stamford, though at many of the places through which it is represented as passing the Vertical Disturbing Forces are positive. We have adhered to our plan of joining stations of minimum Vertical Force Disturbance by straight lines, which in this case makes the line appear more tortuous than, in all probability, it really is.

There is an important maximum of Vertical Disturbing Force at Market Weighton, but the focus of the Disturbance appears to the west of that town. From this point the ridge runs S.E. by S. in an almost straight line to between Boston and Sleaford.

There are indications of centres of attraction to the north of Butterwick-on-Trent, and between Lincoln and Horncastle.

In the south of Lincolnshire this great ridge line, which we have now followed for about 170 miles, becomes more difficult to trace.

It is, no doubt, connected with a well-marked centre of attraction to the south of the Wash, but it is also connected by a minor ridge with the next district on its western flank.

At Melton Mowbray the Vertical Disturbing Force is a maximum, and at Corby is a magnetic col, whence the line of maximum Vertical Disturbance runs to Sleaford and Boston. The existence of this line accounts for the direction of the Forces at Corby and Manton. The direction of the Horizontal Disturbing Force at Grantham is not in good accord with the other indications, but, as its magnitude is only just greater than the limit of the accurate determination of direction, it cannot serve as the basis of a valid objection.

From Stamford a valley line runs to Thetford in Norfolk, and thence south to Colchester and Harwich. The main ridge line runs through the western end of this district, passing through the magnetic peak near King's Lynn.

The remainder of the district is for the most part characterized by large Vertical and small Horizontal Forces, the directions of which are somewhat irregular. The Vertical Forces indicate a ridge line from the Wash to Holt, and there are traces of another between Ipswich and Diss. The directions of the Horizontal Forces are in fair accord with these, but, taken as a whole, our work in East Norfolk and Suffolk has led to less definite results than in any other part of the Kingdom.

DISTRICT 11.—*Derbyshire.*

This district, named after the county in which one of its most salient magnetic features appears, lies to the south of the northern portion of that which has just been discussed.

Indeed, in the north—as has been stated—it is divided from the Lincolnshire and

Yorkshire District by a very arbitrary boundary, which runs across a region of high Vertical Force from Leeds to Burnley.

The southern boundary of the district is a valley line, which runs from Rhyl, in North Wales, *viâ* Whitchurch, Congleton, and Leicester, to Northampton, and thence turns north to Rockingham, where it joins the lines which have been already discussed.

In the north, a ridge line runs almost due east from Southport to Rochdale, and joins near Huddersfield the secondary ridge line, which passes southwards through Harrogate.*

The directions of the Horizontal Disturbing Forces at Preston and Garstang are anomalous, but, as usual in such cases, they are below the limit of the correct determination of direction. To the south of Huddersfield the combined ridge lines run south through Derbyshire parallel to or coincident with the valley of the Derwent.*

Thence it runs in a south-easterly direction *viâ* Alfreton and Bingham to Melton Mowbray, thus entering what in our previous paper we called the Leicestershire District.

The direction of the Horizontal Disturbing Force at Bingham is anomalous, but it is too small to make the discrepancy of any importance.

It may be remembered that in our previous survey we discovered that Melton Mowbray was the seat of powerful Disturbing Forces. We have therefore made fresh observations at other places in the neighbourhood, and have proved that it is the highest point on a ridge line which connects it magnetically with Derbyshire. This line, however, runs more directly north and south than that suggested in our earlier and confessedly tentative discussion of this district ("1890 Memoir," p. 291).

To the south of this group of stations the ridge line appears to be continued past Market Harborough to Dunchurch, and thus to be brought into connection with another district.

DISTRICT 12.—*North Wales.*

The principal feature in this district is a clearly-marked centre of attraction near Snowdon. A ridge line runs from Amlwch, in Anglesea, to Barmouth, north of Cader Idris. The attraction directly towards this line is, however, subordinate to that exercised by the magnetic peak. In all probability it is crossed at right angles by another secondary ridge. Oswestry appears to be more or less isolated, but there is a magnetic col at Llanfyllin, and the secondary ridge line thus indicated runs into another district.

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* Some doubt is caused here by the fact that the Horizontal Force Disturbance at Huddersfield is anomalous, and is directed away from Rochdale where the Vertical Force Disturbance is greater. The indications of the Horizontal and Vertical Forces being thus discordant, we have shown the two alternative ridge lines on Maps 12 and 13, following the Horizontal Forces on Map 13, and the Vertical Forces in Map 12.

DISTRICT 13.—*Mid-Wales.*

A ridge line runs from Stoke-upon-Trent to a point north of Builth, in the upper valley of the Wye. It passes close to the Wrekin, the largest Vertical Force Disturbance in the neighbourhood being at Wellington (Salop).

The secondary ridge from Oswestry probably crosses this district and leaves it at Hay, where there is a magnetic col.

Though interesting geologically, the magnetic characteristics of Mid-Wales are quite simple and clear.

DISTRICT 14.—*Southern England and Wales.*

This great district includes the whole of those parts of England and Wales which have not yet been discussed, with the exception of a region near to the Bristol Channel, and of Devonshire and Cornwall.

The northern boundary runs east from near Cardigan to Bromyard, then turns north for 70 miles to Ashbourne in Derbyshire, thence south to Northampton, and, after a somewhat tortuous course, finally reaches the sea again at Harwich.

This agrees fairly with the result of our last survey, but Mid-Wales is now separated from the southern district, so that in Wales the valley line lies further south than that we previously drew. Birmingham was an anomalous station in our previous survey, and we suggested (" 1890 Memoir," p. 291) that this might be due to the existence of "a district of high vertical force running from Birmingham northward." This forecast has been verified, with the result that the main valley line has here been shifted northwards.

Beginning the description of the district from the extreme north, we find that the Horizontal Disturbing Force at Burton-on-Trent is very small, and is anomalous in direction. A very curious horseshoe-shaped ridge line runs from Bromsgrove round Birmingham to Kenilworth. The evidence of the Vertical is strongly supported by the Horizontal Disturbing Forces.

A very powerful centre of disturbance has been discovered at Stratford-on-Avon, the Vertical Disturbing Force being the largest found south of Newmilns, in Ayrshire. The main ridge line is to the east of the town, and the peak is probably at its intersection with the secondary ridge, which runs south from Melton Mowbray. South of Stratford-on-Avon the Vertical Disturbing Forces, though still large, diminish, and the Horizontal Forces begin to tend southwards. As the valley of the Thames is approached, the vertical disturbance again increases, until the great ridge line is reached which crosses England and Wales from the Thames to Haverford West.

The Vertical Disturbing Forces do not clearly indicate a magnetic connection between Stratford-on-Avon and the Thames Valley. There is, however, some evidence of a secondary valley line running from Alcester to Moreton-in-the-Marsh and Cirencester, and the directions of the Horizontal Disturbing Forces are in accord with the view that the Stratford-on-Avon ridge line is continued parallel to this valley and joins the Thames Valley ridge line near Reading. The magnetic peak, which we formerly discovered near Reading, appears to lie between Henley-on-Thames and High Wycombe, *i.e.*, a little further north than we anticipated. This point is not specially marked by very high Vertical Forces, though Reading and Henley lie on a curious line of maximum Vertical Disturbance which is almost a closed curve. Its form suggests the question whether it is an example of the effect of a flat slab of magnetic matter with steep sides near the edges of which the Vertical Disturbance would be greater than over the central parts.

We are not inclined to insist on any such interpretation, partly because we have but few stations in the central region, and partly because the corrections to the Vertical Forces, on transference from the isomagnetics of either survey to the mean are very large in this part of England. There can, however, be no possible doubt that the Ilsley Downs and the Chiltern Hills, from Marlborough to Tring, are a region of high Vertical Force, to which a number of magnetic ridge lines converge.

One of these we have already traced. Another was described in our previous Memoir as running due south from Reading to the English Channel. A number of additional stations have confirmed our conclusions. This result is important, as M. MOUREAUX, who has for some years been engaged on a magnetic survey of France, has discovered a corresponding line which enters that country near Dieppe, and passes southwards beyond Paris.

Another ridge can be followed eastwards from Reading to Deal parallel to, but about 15 miles north of, the North Downs. Two stations of negative Vertical Disturbance occur close to the ridge at Dartford and Gravesend.

At these the arrows point away from the ridge, but the occurrence of a positive Vertical Disturbance on the north bank of the Thames at Purfleet may prove that the ridge line is in this neighbourhood double; traces of a valley line connecting Stanmore and Southend can also be detected.

In Mid-Kent and Sussex the Horizontal Disturbing Forces are extraordinarily small, being less than the limit of accurate determination of direction at a group of nine neighbouring stations. A very small change in the positions of the Terrestrial Isomagnetics would completely alter the apparent direction of the Horizontal Disturbing Forces at all these places.

It is, however, interesting to observe that the Disturbing Forces at St. Leonards (a repeat station), which appear to be very different when the earlier and later observations are compared with the isomagnetics of the earlier and later survey respectively, are in good accord when referred to the mean lines.

The absolute values of the Vertical Disturbing Forces in this part of England must still be considered doubtful, though this does not in any way weaken the proof that they are relatively large near the North Kent ridge line.

Returning now to the west of the Reading region of high Vertical Force, the ridge line turns north through Stroud, then bends west to Ross. A centre of attraction is very clearly marked on the borders of Hereford and Brecon.

The directions of the arrows indicate its position very exactly, as in the Black Mountains due west of Pontrilas. After this the line is deflected south. There is another centre of attraction about 10 miles north of Swansea, and finally the ridge line enters the Irish Channel a little to the north of Haverfordwest.

A third centre of attraction is situated in the Welsh Coal Field, but, as it is separated from the magnetic ridge we have just discussed by a valley line, we include it in the next district, the exact constitution of which is, however, by no means clear.

District 15.—*The Bristol Channel.*

This district extends on each side of the Bristol Channel, from Monmouth to the south of Dorsetshire, and from Exmoor to the eastern end of the Mendips.

Its most remarkable characteristic is the smallness of the Horizontal Disturbing Forces. Counting stations on the valley line, it includes 28 stations, and at 16 of these the Horizontal Disturbing Force is less than the limit of the accurate determination of direction.

There is certainly a centre of attraction to the north of Cardiff and Newport, and the magnetic cols at Dolygaer (Merthyr Tydfil) and Blakeney suggest that this is closely connected with the main ridge line to the north.

We made a number of observations near the Mendips. These hills appear to be on a magnetic ridge line, but the Horizontal Disturbing Forces are so small that the evidence is not very conclusive, and no clear connection is established with the surrounding districts.

District 16.—*Devonshire.*

In our previous memoir we came to no conclusions as to the magnetic state of Devonshire and Cornwall. The number of stations at which observations had been made was too small. We have now traced a ridge line through Devonshire which may, perhaps, run into the Bristol Channel District.

The Vertical Disturbing Force is a maximum at Drewsteignton, to the north of Dartmoor.

District 17.—*Cornwall.*

At all the stations on the South Coast, from Weymouth to the Land's End, the Disturbing Force is directed southwards, as though there were a ridge line in the Channel. This general tendency is as clear close to the serpentine of the Lizard as on less disturbed ground.

Ireland.

DISTRICT 18.—*Antrim.*

The large masses of basalt which exist in Antrim make it very difficult to obtain evidence of regional disturbance.

The plan we adopted was as follows:—On the eastern coast there are places where non-magnetic rocks occur. On these a number of observations were made, which establish an agreement between the ridge and valley lines of Antrim and those on the opposite Scotch coast.

We have already seen that a well-marked valley line extends through Galloway to Portpatrick. A straight line drawn from Glencaird in this valley to Loch Ranza in Arran is a little longer, but almost parallel to a line drawn from Bangor (just opposite Portpatrick) to Ballycastle (Antrim).

The following alternations of Vertical Disturbance (expressed in terms of 0·00001 C.G.S. unit) occur at stations or groups of stations on or close to these lines:—

	Scotland.		Ireland.	
Valley	Glencaird	− 91	Bangor . . . . Carrickfergus . . .	−90 −41
Ridge	Penwherry	+187	Larne	+21
Valley	Girvan	−104	Ballygalley Bay . . .	− 2
Ridge	Brodick	+223	Carnlough . . . . Waterfoot . . . . . Torr Head	+33 +17 +61
Valley	Loch Ranza	− 29	Ballycastle (Antrim) .	+ 8

Although, therefore, the alternations in Ireland are much less violent, they correspond to those on the opposite coast, and when the valley and ridge lines are drawn on both sides of the North Channel their connection is still more evident.

In the interior of Antrim spots were selected for the stations where the surface soil at all events was non-magnetic. For this purpose the observers carried geological maps, which had been studied, and on which, in some cases, the approximate position of the stations had been chosen before they started on their summer tour. Thus, at Templepatrick, a patch of chalk occurs in the midst of the basalt. The observations were made on this. At other places nothing better could be done than to pick out a firm spot on alluvium near a stream, but in all cases such precautions as were possible were taken.

At many stations also the observations were repeated at two neighbouring places to distinguish as far as possible between regional and local attractions. The disturbances were very great and the results were often in bad accord.

Thus at each of the pairs of stations at Dunloy and south of Ballymena, the two Horizontal Disturbances are in opposite directions. At the two stations north of Ballymena, which were about a mile apart, the Vertical Disturbing Forces were $-0\cdot00274$ and $+0\cdot01233$ C.G.S. unit respectively. Under such circumstances we can arrive at no certain conclusions. Taking, however, the results as they are, and proceeding as usual, we find from the Vertical Disturbances a short ridge line from Carnlough to the neighbourhood of Ballymena, surrounded by a horseshoe-shaped valley line, which in turn is enclosed by a ridge line which runs from Larne to Sperrin. Its continuation northwards is suggested by the high Vertical Force at Coleraine.

If these lines are drawn, the Horizontal Disturbing Forces fit in with the scheme in a surprising way. Putting aside the results at Dunloy and at the stations south of Ballymena, the directions of the Horizontal Forces at Cookstown Junction and Balymena, at the two stations north of Balymena, at Carnlough and Waterfoot are all explained by the central ridge line.

The external ridge is suggested—quite apart from the Vertical Forces—by the Horizontal Forces at the following pairs of stations: Larne and Carrickfergus, Belfast and Templepatrick, Sperrin and Draperstown, Coleraine and Ballycastle (Antrim). A general attraction towards it is also indicated at nearly a dozen external stations, which would be unexplained if a region of high Vertical Force were not interposed between these places and the region of negative disturbance near Ballymena.

One branch of the external ridge points in the direction of the centre of attraction near Islay, thus sugesting a connection between it and the magnetic system of Scotland.

On the whole then, while giving our conclusions as to Antrim with all reserve, we think the solution of this very difficult problem, which is suggested by the Vertical Forces alone, (1) fits in very well with the results arrived at in Scotland, and (2) explains the direction of the Horizontal Disturbing Forces in Antrim better than could have been expected.

DISTRICT 19.—*Mid-Ireland.*

Nearly two-thirds of Ireland are included in this District, the central point of which seems to be the meeting point of several ridge lines near the Slieve Bloom Mountains, at a place the approximate position of which is Lat. 53°, Long. 8°.

The Vertical Forces give a ridge line from Glenfarne to Spiddle in Galway Bay. This is completely confirmed by the arrows at some twenty stations. Ballinamore is anomalous, and Clifden appears to be associated with a submarine region of high Vertical Force.

It is possible that two loci of attraction may intersect in Galway Bay. If not, there is an abrupt change of direction, and the ridge runs east to between Portumna and Nenagh.

It passes between the following pairs of stations :—

Carrick-on-Shannon	and	Kilfree Junction,	15	miles apart.
Castlereagh	,,	Ballaghaderreen	9	,,
Cong	,,	Maum Bridge	11	,,
Oughterard	,,	,, ,,	10	,,
Galway	,,	Lisdoonvarna	19	,,
Loughrea	,,	Gort	14	,,
Portumna	,,	Nenagh	16	,,

The average distance of these places is 13 miles, so that the position of the ridge is fixed at 7 points with an average uncertainty of less than 7 miles.

Nenagh Town gives the highest Vertical Force Disturbance in Ireland, south of Lat. 53°, with the exception of that measured at the Saltee Islands.

Two ridge lines, both clearly marked by the Vertical Force, run from this place to the neighbourhoods of Wexford and Cork respectively. The effect of the former on the Horizontal Forces appears to be entirely subordinate to that of the Slieve Bloom Mountains centre of attraction. It is probably a narrow ridge, but it is, as we shall see, of very special interest.

The second line from Nenagh to Cork is also important and is more clearly indicated by the Horizontal Forces.

At both Kilteely and Cromwell's Hill observations were taken at five stations to determine the effect of the basaltic rocks in that locality. As is always the case when close to the basalt, the results were irregular. Check measurements were also made at Knocklong, about 5 miles away from the basalt. The highest Vertical Disturbing Forces in the neighbourhood (which is a region of low Vertical Force) are as follows, when expressed in terms of 0·0001 metric, or 0·00001 C.G.S. unit :—

Tipperary	+ 6.
Knocklong	— 47.
Cromwell's Hill. Mean of all 5 stations.	— 30.
,, ,, ,, 2 stations furthest from the basalt . .	+ 30.
Kilteely. Mean of all 5 stations	— 17.
,, ,, 2 stations furthest from the basalt	+ 66.

The mean of the Vertical Disturbances at the ten stations at Cromwell's Hill and Kilteely is − 24 ; at the four stations furthest from the basalt + 48.

The latter of these is higher than any Vertical Disturbance nearer than Nenagh, the former is higher than that at any neighbouring station except Tipperary, which is only 11 miles distant.

The direction of the arrow at Tipperary also shows that the locus of attraction lies to the west of that place.

On the whole, then, there can be no doubt that the ridge line passes, if not through the basalt, at all events very near to it. Further to the south it can be traced between Mitchelstown and Doneraile, near to a prominent maximum of Vertical Disturbance at Cork, and thence to an unmistakable magnetic col at Bandon.

The last ridge line which we include in the District of Mid-Ireland passes through Kells, which is, as we previously concluded, a magnetic peak.

The region, of which this is the centre, is cut off from the rest of the District by a shallow magnetic valley, but on the whole we think the evidence of a connection between the Kells ridge line and the Slieve Bloom Mountains centre is so strong that we class them together.

The Kells ridge line first appears in County Down at Annalong, and to which there are a number of stations of high Vertical Force. These may be more or less divided from the rest by a valley line between Dundalk and Castleblaney, but the directions of the arrows at those places and the high Vertical Force at Inniskeen, which lies between them, afford strong arguments against this view.

The ridge line runs between

Dundrum	and	Annalong, which are	12	miles	apart.
Inniskeen	,,	Dundalk ,, ,,	7	,,	,,
,,	,,	Castle Bellingham, which are	10	,,	,,
Kingscourt	,,	Kells, which are	13	,,	,,
Oldcastle	,,	Athboy, which are	15	,,	,,
Street	,,	Mullingar, which are	14	,,	,,

Its position is therefore fixed at 6 points with an average uncertainty of 6 miles.

The valley line referred to above connects Ballinasloe and Baltinglass. There is a magnetic col at Tullamore, and the directions of the Horizontal Disturbing Forces at Athlone and Tullamore, and, it may be added, at Mountrath and Parsonstown, confirm the view that the ridge line under discussion is united with that which undoubtedly passes between the two last-named places.

District 20.—*Wexford.*

There is a centre of attraction in the extreme south-east corner of Ireland, including a station of very large Vertical Disturbance on the Saltee Islands. The fact that the district is close to the coast makes it difficult to determine its characteristics in detail.

The most probable hypothesis appears to be that the Saltee Islands are on the intersection of two ridge lines. The most interesting of these is that which is traced as a secondary ridge from Mountrath to the Saltees.

Its direction strongly suggests its connection with the great ridge line which runs across the South of England and Wales and enters St. George's Channel near St. David's Head.

No. 21.—*Fragmentary Coast Districts.*

Four portions of Ireland are cut off magnetically from the rest by valley lines, but, as they are also bounded by the sea, they are evidently only fragments of magnetic regions, and do not present features of any special interest. One of these is to the north of Donegal Bay. Another includes the county of Kerry, with parts of Cork, Limerick and Clare. In both of these the centre of attraction appears to be under the sea.

A third small District surrounds Bantry Bay. A ridge line runs through it, which is connected with that which has already been traced from Nenagh to Bandon. The fourth District surrounds the town of Wicklow.

It will be referred to hereafter in the discussion on the connection between the magnetic and geological characteristics of this part of Ireland.

On the Relation between the Magnetic and Geological Constitution of the United Kingdom.

Up to this point we have purposely confined ourselves exclusively to the discussion of the results of our magnetic observations. The arguments for and against the conclusions at which we have arrived have been set forth, and we have distinguished, as far as possible, between views which we believe to be indisputable and those which must be regarded as only more or less probable.

In discussing the relations between our magnetic ridge and valley lines, and the geological constitution of the districts through which they run, we do not propose to balance again the facts by which we have been led to the opinions represented in Map 13. We shall assume—as we think we are entitled to assume—that they are in the main correct, and we shall compare them with the conclusions of geologists.

One of us has already discussed the question as to how far the Disturbances we have observed are of the same order of magnitude as those which would be produced by large underground masses of rock of the magnetic susceptibility of the basalts and gabbros which occur on the surface. ('Proc. Roy. Soc.,' 1890, vol. 48, pp. 505–535.) The general conclusion arrived at was that such a cause would be adequate to produce the observed effects. One point, however, which was not specially insisted on, deserves further elucidation.

The magnetic rock theory is unquestionably open to the criticism that whereas it attributes Disturbances which extend for scores or even hundreds of miles to magnetic rocks, large masses of such rocks often produce little or no effect at what are regarded as surprisingly small distances.

It is therefore desirable to apply calculation to a few cases, and to show that results, which are at first sight discordant, do not in any way invalidate the hypothesis. Some of them can hardly be said to support it, as the bases of the magnetic masses are concealed underground, and in the calculations, assumptions which are unproved, and are perhaps incapable of proof, have to be made as to the forms of these concealed foundations. All that can be done is to show that the different results are compatible with, and are therefore not valid evidence against, the rock theory.

Two points made in the paper already referred to may be mentioned here, though they need not be further discussed.

The first is that the purely local Disturbance, due to a mass of magnetic rock, of which the susceptibility is as small as that of basalt or gabbro, will be the same, whether it rests on magnetic or non-magnetic material, though of course in the one case it will, and in the other it will not be supplemented by other Disturbing Forces.

The second conclusion is that, having regard to the rise of temperature as the depth increases, iron and magnetite will cease to be magnetic at about 12 miles from the surface of the globe, if the great pressure to which they are there subjected does not affect their behaviour in this respect. In no case, therefore, can the lower face of a magnetic rock be assumed to be more than 12 miles from the surface.

Bearing these general conclusions in mind, we may now proceed to consider in detail whether any connection exists between local and regional magnetic Disturbances observed in the United Kingdom, and its geological confirmation.

The discussion will be divided into five heads, viz., the relations of Magnetic Ridge Lines or centres of attraction to :—

(1.) Dykes, basaltic sheets, and isolated masses of trap, the largest linear dimensions of which do not exceed a mile or two.

(2.) Districts which are either entirely basaltic or in which numerous masses of trap appear.

(3.) Non-basic masses of igneous rock.

(4.) Faults.

(5.) Regions in which the arrangement of the rocks is anticlinal.

To illustrate our arguments Map 14 has been prepared for us under the kind superintendence of Professor Judd, F.R.S.

The basic rocks are coloured red. The other formations are divided into groups in such a way as to bring out the points on which we wish to dwell. Only those magnetic ridge lines are indicated to which we refer in the present discussion. It is easy to see where the others occur by comparing with Map 13.

We have to thank our colleague, Professor JUDD, Sir ARCHIBALD GEIKIE, Director-General of the Geological Survey, and the late Mr. TOPLEY F.R.S., for much valuable advice and assistance.

Magnetic Disturbances produced by Dykes, Trap Sheets, and Isolated Masses of Basalt.

There are two principal types of basaltic plates to be considered, viz. : vertical dykes and sheets, which, like the great Whin Sill, are nearly horizontal.

We have examined four specimens of basalt from the Boulmer Dyke, north of Alnmouth in Northumberland, and find the average susceptibility to be 0·0015, which is nearly the same as that of the Mull rocks (0·0016).

The Boulmer Dyke is vertical and is about 100 feet wide.

Assuming these data, it is easy to show that even if the out-crops of the dykes and sheets were infinitely long, and if the vertical dimensions of a vertical dyke, and the horizontal extension of a horizontal sheet were infinite, their magnetization by the earth's field could not produce Disturbing Forces which could be detected beyond a couple of hundred yards from their edges.

Thus, if the upper or horizontal surface of a rectangular vertical dyke, of susceptibility 0·0016, and 100 feet wide, were 25 feet below the surface, the Forces due to it, expressed in terms of 0·0001 metric unit, would be as follows :—

Distance in feet from line on surface vertically above centre of dyke.	Disturbing Forces.*	
	Horizontal.	Vertical.
0	0	329
50	208	202
150	98	10
250	59	
350	42	
450	33	

If the planes of the sides were in the magnetic meridian, or if they were perpendicular to the magnetic meridian, but inclined to the horizontal at the angle of dip, the above would be the Disturbances produced.

The Vertical Disturbance would become too small to be detected only 100 feet from the edge of the dyke; the Horizontal Disturbance would be below the limit of the accurate determination of direction at a distance of a little over 450 feet.

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* It will be remembered that in terms of the units employed in this table 30 is a very small Horizontal Disturbance, and that two independent determinations of the Vertical Disturbance differ on the average by 60.

If an observer, seeking for the dyke by the aid of the magnet, missed the central line by 200 yards, he would not detect the presence of the igneous rocks.

In general the Vertical Faces would also be magnetized, but they would affect the distribution of the Force near the dyke rather than extend the limits of its influence.

Thus if we suppose them to be truly vertical and perpendicular to the magnetic meridian, the Vertical Disturbing Force will be positive on the southern and negative on the northern side.

The Horizontal Disturbance will be negative (*i.e.*, it will act southwards) above and to the north of the dyke.

The following table gives the magnitudes of these forces, the columns being arranged as before :—

Distance in feet.	Disturbing Forces.	
	Horizontal.	Vertical.
0	−110	0
50	− 67	± 70
150	± 3	± 33

Adding these algebraically to the numbers previously obtained, we get the following table :—

Distance in feet.	Disturbing Forces.	
	Horizontal.	Vertical.
150 S	101	43
50 S	141	272
0	−110	329
50 N	−275	132
150 N	− 95	− 23

These figures prove that under the assumed conditions the forces due to the Vertical Faces do not produce important effects, except close to the dyke itself.

It is, perhaps, needless to give similar tables to illustrate the case of a nearly Horizontal Dyke. The upper and lower faces are oppositely magnetized, and they neutralize each other's effects except within a short distance of the edge. It may at first sight seem extraordinary that a sheet so widely extended as that which is indicated by the outcrop of the Whin Sill should produce no far-reaching effects, but it would be quite contrary to the theory we are discussing if such results were observed.

As the main object of our enquiry has been to discover regional attractions, we have for the most part given a wide berth to dykes. A chain of stations was, however, run across the Boulmer Dyke, which is exposed only on the coast, and runs out to sea in an east and west direction. Observations were taken above it a few yards inland, where it is believed to be covered by about 25 feet of drift, at a point 90 yards to the south, and at two points 70 and 90 yards to the north of it respectively.

The Disturbances were very small, and indicated, if anything, a slight repulsive force. It would not be surprising if no Disturbance were detected at 70 yards; it is somewhat remarkable that no result was obtained immediately above the trap. There is, of course, no lack of evidence that dykes do produce magnetic Disturbances, and the cause of our failure to detect them in this case must be due to some special circumstance.

As we have already stated, the mean susceptibility of the four specimens of the rock which we have examined was 0·0015, but the fragments differed so widely (from 0·00361 to 0·00003) that it is possible the true average susceptibility may be much less. It is also possible that near the spot where the observations were made the dyke is permanently magnetized in a direction opposite to the induced magnetization produced by the earth's field. Such hypotheses are, however, mere guesses. The point requires further elucidation, but as it can be taken up at any time, while regional forces can only be studied near to the epoch for which the Terrestrial Isomagnetics have been determined, we have not up to the present pursued it further.

As we are discussing observations made close to masses of basalt, this is, perhaps, the most convenient place to describe two sets of experiments made near the igneous rocks to the south-east of Limerick.

A little to the north of the village of Kilteely a large portion of a curious ring-shaped mass of basalt is exposed. It is several miles long and from half to three-quarters of a mile broad, and is the outcrop of a basin of basic rock.

The results obtained are summarized below, the Disturbing Forces being, as usual, expressed in terms of 0·00001 C.G.S., or 0·0001 metric unit.

KILTEELY.

Number of station.	Description of station.	Disturbing Forces.	
		Horizontal.	Vertical.
807	About 300 yards S. of the basalt . . .	19	+125
806	Close to the S. edge of the basalt . . .	659	+ 37
808	Close to the N. edge of the basalt . . .	510	− 17
809	About 120 yards N. of the basalt . . .	70	−235
810	About 300 yards N. of the basalt . . .	115	+ 7

The directions of the Horizontal Disturbances are rather erratic, but they increase in magnitude as the rocks are approached. The (algebraically) small values of the Vertical Disturbing Force near to the northern edge of the basalt are difficult to explain as the results of induction, in view of the gradual slope of the mass of trap shown in the section of the hill close to our stations, published by the Geological Survey of Ireland (Horizontal Section, Sheet 7, Section 2).

If the rock is permanently magnetized, the result could be more easily accounted for. Whether, owing to this cause, or to variations in permeability which make the effects irregular, our experience is that, while the attraction exerted by very large masses of basalt (such as that in Antrim) can be demonstrated at places near to but not actually on the magnetic rock, yet on the surface of the basalt itself repulsive forces are at least as common as attractions.

This is certainly true of Antrim, and is suggested by the experiments at Kilteely.

The whole question as to the cause of the permanent magnetism of rocks is obscure, but there seems little doubt that, while it plays a great part in producing local disturbances, it is so irregular that it gives rise to no regional effects.

Observations were made at another set of five stations near Cromwell's Hill, about two miles south of Kilteely. This spot was chosen because the section published by the Geological Survey runs through the hill. It is a mass of elvanite, about half a mile long by 300 yards wide. There was, therefore, every reason to expect that the Disturbances would be less than at Kilteely.

The results were as follows, in terms of 0·00001 C.G.S. unit.

Cromwell's Hill.

No.	Description of station.	Components of Disturbing Force.		
		North.	West.	Vertical.
757	500 yards S. of the hill	+89	− 5	+ 59
756	100 yards S. of the hill	+44	−32	+ 1
755	Close to the S. edge of the igneous rock . .	+25	−60	− 36
758	About 100 yards N. of the igneous rock, but due W. of the centre of the mass	+36	−72	− 52
759	400 yards W. of the last station and N.W. of the rock	+47	−32	−120
	Mean	+48	−40	− 30

From this it is evident that the station is affected by a regional Force, the Horizontal Components of which are $n = +48$, $w = -40$. Hence its line of action is N. 40° E., *i.e.*, it appears to be affected by the large igneous masses to the north.

Subtracting the means from the individual values we get the following secondary disturbances.

No. of station.	n'.	w'.	v'.
757	+41	+35	+89
756	− 4	+ 8	+29
755	−23	−20	− 6
758	−12	−32	−22
759	− 1	+ 8	−90

There is thus a regular decrease in the Vertical Force, as the hill is crossed from south to north. This is the effect which would be produced if the opposite magnetizations of the two vertical faces were the efficient causes of the phenomenon.

The Horizontal Disturbing Forces are very small, and only exceed the limits of accurate determination of direction at two stations (757 and 758). At both of these they indicate an attraction. The results would probably be best explained by the hypothesis that the crystalline mass is more magnetic at some depth below the surface than in the exposed parts.

This is quite possible. Elvanite is not a strongly magnetic rock, and though but little stress can be laid on results obtained with a single specimen, a portion brought away by Mr. GRAY showed no magnetic susceptibility. If the rock a few hundred feet underground contains more magnetite, and if the surface of separation between the magnetic and non-magnetic parts is rounded or otherwise symmetrically arranged about the core, the observed facts could be very easily accounted for.

We now proceed to investigate cases in which we have found no magnetic effects at moderate distances from large masses of trap of much greater thickness than those heretofore considered.

The first locality that we choose for detailed discussion is the basaltic island of Canna, near Skye. We investigated its magnetic properties during our earlier survey.

The island is about 5 miles long by a mile and a half broad, and we felt certain that when the yacht in which we were making observations was 200 yards from the eastern shore, sailing almost magnetic south, the compasss was not deflected 1°·5.

Hence, as at Canna, the normal Horizontal Force is about 0·15 C.G.S. unit, the Disturbing Horizontal Force perpendicular to our course cannot have exceeded

$$\frac{1\cdot 5}{57\cdot 3} \times 0\cdot 15 = 0\cdot 004 \text{ C.G.S. unit.}$$

Let us now enquire whether, if the island be regarded as a basaltic mass magnetized by the earth's field, the Horizontal Disturbing Force falls below this limit.

The greatest length is east and west, the highest point is 724 feet above the sea. We shall, therefore, certainly exaggerate the effect of the upper surface of the island if we regard it as a rectangle 5 miles long and 2 wide lying in the plane of the compass. The eastern side of the island rises steeply from the shore, and, being nearly in the magnetic meridian, would be but feebly magnetized by the Horizontal Force.

The highest point is some distance inland, and the cliffs sink towards the south. Hence, we shall certainly exaggerate the effect of this side if we regard it as a vertical rectangle 2 miles long and 600 feet high, distant only 200 yards from the place of observation, and magnetized by the Horizontal Component of the earth's field resolved perpendicular to it.

As for the part of the island below the sea, we may suppose this plane to be carried down to any depth, but, if so, we must treat the more distant western side in the same way. This would, of course, be magnetized in the opposite sense, and thus we immensely exaggerate the effect of the submerged part of the nearest face of the island, if we replace it by a rectangle of infinite depth and two miles wide, and if we further neglect the more distant side of the island altogether. By this supposition we also remove the lower surface of the mass of basalt which would tend to counteract the influence of the upper part.

The observation was made near the north-eastern corner of the island, and the magnetization of the northern face would have produced a greater effect than that of the more distant southern side, and would have tended to diminish the attraction.

We shall, therefore, certainly over-estimate the Horizontal Disturbance due to the island if we consider it to be produced—

(1.) By the upper surface of a plate of basalt 5 miles long and 2 wide, magnetized by the earth's field, the yacht being 200 yards from one of its narrower edges where the observation was taken.

(2.) By a similar vertical plane 200 yards distant, rising 200 yards above the yacht and of infinite depth, lying in the geographical meridian.

(3.) If we suppose the yacht to have been in the vertical plane, which bisects both the above, instead of being, as was the fact, near one corner of the island.

(4.) If we neglect all the other faces of the island, which, on the whole, would have tended to diminish the Force.

If V and H be the Vertical and Horizontal Components of the earth's magnetic field respectively, δ the Declination, κ the susceptibility of the basalt, $2x$ the breadth of the nearest side of the island, and y_1 and y_2 the distances of the nearest and furthest sides, the Horizontal Disturbing Force, as calculated on the above assumption, in C.G.S. units is

$$2\kappa\left[\mathrm{V}\log_e\left\{\frac{y_2}{y_1}\times\frac{x+\sqrt{(x^2+y_1^2)}}{x+\sqrt{(x^2+y_2^2)}}\right\}+\mathrm{H}\sin\delta\left\{\sin^{-1}\frac{x}{\sqrt{2}\sqrt{(x^2+y_1^2)}}+\sin^{-1}\frac{x}{\sqrt{(x^2+y_1^2)}}\right\}\right],$$

when $V = 0{\cdot}47$, $H = 0{\cdot}15$, $\sin\delta = 0{\cdot}4$ about, $x = 1$ mile, $y_1 = \frac{200}{1760} = \frac{1}{8{\cdot}8}$ mile, $y_2 = 5 + \frac{1}{8{\cdot}8}$ miles.

Hence the force becomes $2{\cdot}8\kappa$.

To show how enormously these numbers may exceed the true forces, we have only to remember that if we had supposed the visible and submerged surfaces of the island to be planes at the same height, say 300 feet, above and below the compass respectively, they would have neutralized each other's effects, and the Force would have been only $0{\cdot}11\kappa$.

This latter supposition is much more likely to be in accord with fact. The island of Canna is merely a hump on a lava stream. Sir ARCHIBALD GEIKIE informs us that the thickest visible mass of bedded lavas among the Western Isles occurs at Ben More in Mull, where these rocks somewhat exceed 3000 feet in total depth. The three soundings given in the Admiralty Chart nearest to the north, east, and south sides of Canna are 40, 75, and 40 fathoms respectively. The mean of these is nearly 300 feet, so that the hypothesis that the island may be regarded as a block, the total height of which above the main lava sheet is 600 feet (300 below and 300 above water), is justified.

It is true that on the western side, remote from that on which our observation was made, there is a patch of shoal water several miles in area, the sounding nearest to the island being only 14 fathoms. If we assume this shoal water to mark a submerged extension of the more elevated basalt, it would be represented by a sheet 300 feet thick and a few square miles in area laid on the top of the main mass. It will be shown hereafter that, even when the observations are made on land with the most delicate apparatus, the Disturbances due to such thin sheets become insensible at distances from their edges equal to a few multiples of their thickness. The points at which we began and ended our observations were about 8 and 5 miles from the shoal respectively, or about 140 and 88 times its assumed thickness. The difference between the effects produced could not have been detected by a magnetometer, and would be absolutely inappreciable on a compass.

Hence the only consideration which we have omitted, which might have tended to increase the force, is that we have supposed the eastern face of the island to be vertical instead of sloping towards the sea. The Force due to this face is, however, but a small fraction of the whole, and if we doubled or trebled it, no serious difference would be produced in our results. Considering, therefore, that all our assumptions have tended to make the Disturbance impossibly large, we may safely say that the Horizontal Force cannot be greater than $2{\cdot}8\kappa$, and may be 25 times less than this quantity.

Two fragments of basalt from Canna gave $\kappa = 0{\cdot}0015$ and $0{\cdot}0013$ respectively.

The mean of 13 specimens from Mull was $0{\cdot}0016$.

The average of 36 specimens of basalt and gabbro from the West of Scotland and Ireland was 0·00245. Using these values we get the following results :—

κ.	Horizontal Disturbing Force.	
	Less than $2\cdot8\kappa$.	Possibly not greater than $0\cdot11\kappa$.
0·00160 0·00245	0·00448 0·00686	0·00018 0·00027

In other words, whereas experiment showed that the Force was $< 0\cdot00400$, calculation proves that, on the most extravagant assumptions, it could not possibly have exceeded that amount by more than 50 per cent., while it may have been 20, and very possibly was 10 times less.

There is, therefore, nothing in the result obtained at Canna to throw doubt on calculations based on the assumption that regional magnetic Disturbances are due to masses of magnetic rock.

It may, however, very properly be urged that the observation at Canna was made at sea, and that although the Disturbance could not be detected by the compass, it would have been easily measured if the magnetometer had been placed in the same position on good non-magnetic observing ground.

This is quite true, and on the island itself the Disturbances were very great, but the statement that such effects die out quickly with distance, is supported by observations made elsewhere on land.

It may be well to exhibit in a table the Forces due to a rectangular mass of basalt, of which the top and bottom surfaces are squares and the sides are vertical, when it is magnetized by the earth's magnetic field in the United Kingdom.

We will suppose the mass to be so arranged that two sides are in the magnetic meridian. The other two are, therefore, magnetized by the horizontal component of the earth's field.

The point, for which the Disturbances are calculated, is in the vertical plane which bisects these two sides, in the plane of the upper surface. All lengths are expressed in terms of that of a horizontal side of the parallelopipedon.

The Forces are calculated as before for the two susceptibilities 0·0016 and 0·0024.

The Disturbances are in terms of 0·00001 C.G.S., *i.e.*, 0·0001 metric unit.

The results are as follows :—

$\frac{\text{Depth}}{\text{edge}}$.	Distance from nearest face.	Horizontal Disturbance.	
		$\kappa = 0{\cdot}0016$.	$\kappa = 0{\cdot}0024$.
$\frac{1}{2}$	1	13 or − 1	18 or − 2
$\frac{1}{2}$	$\frac{1}{2}$	51 or 9	76 or 13
$\frac{1}{4}$	1	5 or − 2	7 or − 3
$\frac{1}{4}$	$\frac{1}{2}$	24 or − 3	36 or − 5

The two values given in each case are for corresponding positions on opposite sides of the mass. The Forces due to the horizontal faces are in each case the same, but those produced by the vertical faces change sign according as the point is magnetic north or south of the rock.

If we suppose that instead of being vertical the nearer face of the rock has a slope of 1 in 8, the Forces at distant points are increased. One example will suffice.

$\frac{\text{Depth}}{\text{edge}}$.	Distance from nearest face.	Horizontal Disturbance.	
$\frac{1}{4}$	1	24·1	36·1

It is evident from the first set of figures that the Forces at distances such as those for which the calculations are made, diminish very rapidly with the vertical thickness of the plate.

Thus, if a mass of basalt, a mile and a half square, of susceptibility 0·0024, were three-eighths of a mile, *i.e.*, say 2000 feet thick, the Horizontal Disturbance a mile and a half from it would be quite negligible, amounting to only 0·00007 C.G.S. unit towards the rock on one side, and 0·00003 *away from it* on the other.

If the susceptibility were not greater than that of the Mull specimens, the columnar mass might be 4000 feet deep, and yet produce at points a mile and a half distant Horizontal Disturbances far below our limit of the accurate determination of direction. It will be remembered that this limit is 0·00030 C.G.S. unit, whereas the forces in question are 0·00013 and 0·00001 unit.

These calculations throw light upon observations made near Titterstone Hill in Shropshire, as they explain a negative result obtained near to it. The hill consists of two masses of basalt, of which the larger is about two miles long and one mile wide.

Basaltic pipes or feeders may extend downwards to an indefinite depth, but the sheet is of small thickness and has been pierced by the shafts of coal mines.

It is immediately surrounded by a narrow band of the coal measures, which are succeeded by the Old Red Sandstone.

Observations were made on the east and west sides at Bitterley and Hopton Wafers, at points about a mile and a half from the basalt.

The result was that the Horizontal Disturbing Force at Bitterley acted nearly due west, *i.e.*, at right angles to the line joining the station to the centre of the basalt. Hence, no relation whatever was established between the directions of the Disturbing Forces and the magnetic rocks.

This result is in conformity with the above calculations, but it may be observed it has more than a merely negative value. If a relatively thin sheet of basalt were extruded through pipes communicating with a deep-seated magma, it is conceivable that in some cases the position of the outflow may have been determined by the nearer approach of the magma to the surface.

If this were the case, and if the top of the concealed underground basaltic fold were at a moderate depth, it is possible that attractions in play in the neighbourhood of the visible magnetic mass, which could not be due to it, might be caused by its concealed foundations. Thus the absence of attractive forces a mile and a half from Titterstone Hill proves that there is beneath it no very remarkable pillar-like prominence on the basic substratum.

A number of isolated patches of "greenstone" occur near the boundary between the Devonian and the Carboniferous formations on the west of Devonshire.

To the north of the larger of these patches, and about a mile and a half distant from them, is Brent Tor, an isolated hill with a basic core. Observations were made at two stations to the east and west of it respectively. In the direct line they were a little more than half a mile apart, on good observing ground, and each about an eighth of a mile from the Greenstone.

The directions of the Disturbing Forces were 30° W. of N. at the westerly station (at which the Disturbing Force was much the larger), and 26° W. of N. at the easterly station. Hence both Forces were directed away from the relatively large quantities of Greenstone to the *north*, and the much nearer, but also the much smaller mass of Brent Tor, produced no appreciable effect.

A mass of isolated basalt and andesite occurs at Builth.

The Disturbing Force at a station a mile to the north points directly away from it towards the important magnetic ridge line which occurs to the south.

To the south of the estuary at Barmouth is a mass of felspathic trap and "greenstone," about 4 miles wide. Igneous rocks are also found to the north of the town, and, indeed, occupy a large part of North Wales, but the largest mass in its immediate neighbourhood is Cader Idris to the south.

Two stations were carefully chosen on good observing ground about 3½ miles apart, and from a mile to a mile and a half distant from the Cader Idris range. In both cases the Disturbing Forces pointed north, thereby showing that the regional attraction was predominant even a mile and a half from a very conspicuous basaltic mass.

Limerick is near the northern boundary of an isolated series of patches of igneous rocks, but the Horizontal Disturbing Force acts northwards, *i.e.*, away from the intrusive masses.*

Conclusions such as these are important, as showing that even within moderate distances of relatively large masses of basalt the regional forces may be determined free of all purely local disturbance.

Basaltic Districts.

We now turn to the apparently inconsistent deduction that, in spite of this fact, magnetic rocks may account for ridge lines, which appear to dominate very large areas.

In such cases we have to assume (1) that the vertical thickness of the mass is much greater than has hitherto been supposed, and (2) that it extends laterally underground to great distances from the points where it occurs on the surface.

These assumptions must, we think, appear reasonable, though, in some cases, no known geological facts may warrant them.

It must, however, be remembered that the knowledge of geologists is practically confined to a few thousand feet from the surface, and in many cases does not extend so far.

But the magnet would be capable of detecting large masses of magnetic rock at a depth of several miles, and the theory we are discussing can hardly be entertained unless we can assume that such masses exist.

Nor is the hypothesis of the lateral extension of trap rocks for great distances around the points where they appear on the surface negatived by the fact that the sides of the visible mass are vertical, or that it is known to be a relatively thin sheet. The surface basalt may spring from a great underground fold of magnetic matter, which may slope gradually away from the area at which more or less accidental circumstances determined the form of the extruded mass.

If, however, this is so, we must draw attention to the fact that these considerations reduce the significance of the particular place or places where the rocks appear. The highest point on an island may be at one end. Mountain chains do not culminate exactly in their centres. In like manner the point at which an underground mass of basalt reaches the surface may or may not lie on the magnetic ridge line which marks the points where the downward pull due to the whole mass is a maximum. This might explain the fact that near Limerick, and in several other places, masses of basalt lie near to but not on a ridge line.

If, on the other hand, the exposed portion is very large and widespread, its relative importance must be greater, and it is more likely that it will be closely associated with a locus of attraction. In this case, however, difficulties of an opposite kind are encountered; the local disturbances being so great that, although ridge lines may be traced up to the mass, it is difficult to follow them across it.

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* Observations made close to these rocks are described below, pp. 641–2.

All therefore that can be expected is that we should be able to show that far-reaching underground extensions of basaltic rocks would be competent to produce the observed disturbances, and that in the case of very large exposures of basaltic rocks the regions in which they occur are in general clearly marked centres of attraction.

We will take these points in order.

The first has been dealt with in the paper already referred to, but the application of calculation to the case of Antrim will serve as an additional example.

The basaltic surface of North-East Ireland may be roughly represented by a square, each side of which is 50 miles long. The length from north to south is somewhat greater, and the breadth less than 50 miles. It forms the centre of a magnetic district which extends some 50 miles from the edge of the basalt.

The calculations made above are not applicable when the distances involved are so great that the curvature of the earth has to be taken into account. In this case, however, they are sufficiently accurate to illustrate the principle.

The thickness of the Antrim basalt after denudation is only about 1,200 feet. Disturbances directly due to the visible mass would therefore be unimportant a very few miles from its edge.

Even if we supposed the basalt to extend from the surface to the depth at which it would cease to be magnetic (say 12 miles), the ratio of the thickness of the block to the length of an edge would not exceed one-fourth, and it has been shown that such a mass would produce no effect at a distance from the nearest face equal to the length of an edge, that is, at 50 miles, whereas at Letterkenny and Stranorlar, which are about 40 miles distant, the attractive Forces, though not large, are appreciable.

We can explain, therefore, the Forces at these places by their proximity to Antrim only on the assumption that beneath the basaltic districts there is a magnetic mass, the upper face of which is separated from, but approaches relatively near to the visible mass (say, within a mile or a mile and a half) and slopes away from it towards the west.

It would then approximately fulfil the conditions assumed by the second calculation given above. Its upper surface would be 6 miles below the sea level at 50 miles from the edge of the visible basalt, but the Horizontal Force would be 0·00036 instead of only 0·00007 C.G.S. unit. As a matter of fact, the Horizontal Disturbance at Letterkenny is 0·00035 and at Stranorlar 0·00041 C.G.S. unit. The close agreement between these numbers and the calculated Force is, of course, accidental, but they are sufficient to show that, although masses with steep sides and of moderate thickness would produce very small Forces at distances from these edges comparable with their linear dimensions, yet if the sides slope gradually away the Forces may be appreciable.

It must also be remembered that although the highest susceptibility we have taken as a basis of calculation is the mean of a number of specimens from Scotland, much larger mean values were obtained in groups of specimens from Skye. All the largest values of the Forces above calculated might be doubled without the susceptibility exceeding that of rocks which occur on the surface, and, even if in any given locality the surface rocks are only feebly susceptible, it is possible that they may overlie more strongly magnetic masses.

On the whole then, it appears that all the observed facts, the smallness of the Disturbances in some cases, and their magnitude in others, are consistent with the theory that they are caused—in part, at all events—by basic rocks magnetized in the earth's field.

We now proceed to enquire how far the main centres in which basic rocks occur are also centres of magnetic attraction.

The easiest way of conducting the enquiry is to study stations near to the main masses of igneous rocks, but yet sufficiently distant to make local Disturbances unimportant as compared with the regional attraction.

If at all such stations the Horizontal Disturbing Forces tend towards the igneous mass, it is obvious that it is on the whole a centre of attraction.

Of course doubtful points arise, in deciding which there is sometimes room for difference of opinion.

Thus if a comparatively insignificant group of magnetic rocks appears on the surface, near to, but completely detached from, a much larger intrusive mass, it may be doubtful whether it should or should not be included within the girdle of external stations.

If it is included, it may divert the line so far from the central region, that the cogency of the proof is diminished. If it is not included, there is the risk that, though of trifling superficial area, it may represent an important underground extension, and that the Disturbing Forces in the intermediate space may be subject to local variations.

On the whole we have thought it best in each case to keep as near to the principal mass of rock as possible, but if the district between it and an apparent outlier appear to be locally disturbed, we have carried the boundary outside the latter. In all cases, where any doubt can arise, the reasons for the selection of the stations are given.

Another difficulty arises from the fact that the Disturbances due to igneous rocks, which appear on the surface, are interfered with by important ridge lines, which are either connected with another group of rocks or traverse a neighbouring district where the superficial soil is non-magnetic.

Obviously all difficulties are increased if a magnetic district is largely covered by the sea.

There are three principal districts in which basic rocks are found, with a profusion far exceeding that which occurs in any other part of the United Kingdom. They are Antrim, Mid-Scotland, and the West Coast of Scotland.

The first two of these unquestionably attract the needle at places near to but clear of the magnetic rocks.

To prove this we need only refer to Map 14, in which the basic rocks are coloured red, and the directions of the Horizontal Disturbing Forces at stations near the rock are shown. All round the Antrim basalt the Horizontal Disturbing Forces are directed towards it. This is shown at no less than fourteen places, viz., Drumsurn, Dungiven, Sperrin, Dungannon, Armagh, Lurgan, Lisburn, Belfast, Carrickfergus, Larne, Ballygalley Head, Carnlough, Waterfoot, and Ballycastle.

At Draperstown the Horizontal Disturbance is directed away from the basalt, in which, however, this station is to a certain extent embayed. It therefore hardly satisfies the condition we are laying down; viz., that the stations considered must be clear of the attracting mass.

Similarly, a line of stations can be drawn round the Scotch Coal Field District, which indicate that it, too, is a centre of attraction. They are Campbelton, Torrisdale, Loch Ranza, Cumbrae, Row, Dumblane, Crieff Junction, Perth, Stanley Junction, Glamis, St. Andrews, Dunbar, Heriot, Dolphinton, Carstairs, Abington, Loch Doon, Pinvalley, and Penwherry.

Against these nineteen must be set Leadburn on the south, and Alyth and Monikie in the north. In the latter two cases, however, the apparent discrepancy is readily explained. There is abundant evidence that another ridge line runs a little to the north of the district we are considering, which affects Alyth.

The results at Monikie and Arbroath, on the other hand, suggest an underground extension of the volcanic rocks.* However this may be, the number of discrepancies is relatively very small.

On the West Coast there is not the same clear evidence that the visible masses are centres of attraction. We have shown that the hypothesis that ridge lines run through Skye and Mull is consistent with the facts, but the effects of the visible masses appear to be of less importance than those due to concealed centres. In Skye there is a powerful focus of attraction on the eastern portion of the island, where the surface rock is not basalt; and, as we have pointed out, the effect produced by Mull is subordinate to an attraction directed to the south of the Hebrides.

It must, however, be recollected that much of this district is covered by the sea, and that important ridge lines which run near its boundaries make it very difficult to solve all the problems it suggests.

Next to the districts above mentioned, North Wales is, perhaps, that in which the largest basic masses occur. This is unmistakably a centre of attraction. The Horizontal Disturbing Forces at Beaumaris, Carnarvon, Pwllheli, Port Madoc, Abergwynolwyn, Bala, Bettws-y-Coed, and Llandudno are all directed towards the igneous rocks, which are in part basic, and may in part rest on a basic substratum.

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* In Forfarshire another volcanic area occurs, belonging to the Old Red Sandstone.

Following next in importance after North Wales come Devonshire and Cornwall, Wexford and Wicklow. In both of these the basic masses occur in long lines, which suggest that they have not much lateral extension, or that they are the edges of relatively thin sheets, or are connected with narrow pipes. However this may be, though there are suggestions of lines of magnetic attraction parallel to both of them, in Devonshire and in the east of Wexford, neither is a centre of attraction. There is a station of relatively high Vertical Force on the serpentine of the Lizard, but here, too, the main centre of attraction appears to be out at sea.

Three other districts remain. The most important is North-West Donegal, a wild region, in which we have comparatively few stations. At five stations near Londonderry the Horizontal Disturbing Force is directed towards the trap rocks. The same statement is true of the stations to the north of the basic masses near Newry and Carlingford. To the south of these the main attraction is exerted towards a ridge line which runs out from them, and probably marks an underground continuation of the trap.

In Pembrokeshire, also, the strips of igneous rocks lie close to a ridge line, and the Horizontal Disturbing Forces at Cardigan, Haverfordwest, and Milford are directed towards it.

The basalt to the south-east of Limerick also lies near a ridge line, but is not a centre of attraction, though some of the igneous rocks are very basic.

The scattered masses in Mid-Wales and Mid-England, and the dykes in the north of England, are discussed separately.

Putting them aside the results we have arrived at may be summed up as in the following Table :—

PRINCIPAL Masses of Trap Rocks in the order of their importance.

Skye and Mull	Probably traversed by ridge lines
Antrim	A centre of attraction
Mid-Scotland	” ”
North Wales	” ”
Wexford and Wicklow . . .	No apparent regional magnetic effect
Devonshire and Cornwall . .	” ” ” (except at the Lizard)
Donegal	A centre of attraction
Pembrokeshire	On a ridge line
Limerick	Near a ridge line

Igneous Rocks which are but slightly, or not at all Basic.

In general, masses of non-basic igneous rocks appear to produce little or no effect on the needle. This holds good of Dartmoor, Wicklow, and many parts of Scotland.

There are two principal exceptions, viz., the Cheviot and Berwickshire District, and the igneous rocks of Galway. These are marked by red dots in Maps 39 and 40 respectively.

The Cheviots and Berwickshire.

It has already been shown that at Jedburgh, Kelso, and Wooler, the three stations nearest to the central mass of crystalline rock, the Vertical Force is large and the Horizontal Disturbing Forces tend inwards.

The evidence may perhaps be put more strongly in another way.

Greenlaw, Earlston, Selkirk, Hawick, Riccarton Junction, Harbottle, Alnwick, and Wooler form a ring of eight stations surrounding but clear of the igneous rocks. Of these the four most distant are Selkirk, Hawick, Riccarton Junction, and Alnwick.

The mean northerly component of the Horizontal Disturbing Force at the four nearer stations (expressed in terms of 0·0001 metric or 0·00001 C.G.S. unit) is 35, and at the four more distant stations it is 41. The mean westerly components at the same two groups are 9 and 3 respectively. The two latter are both so small that it is evident that the mean Disturbing Force in the district acts almost due north.

Regarding this as a regional disturbance due to the Scotch Coal Field ridge line, we may attempt to find disturbances of the second order due only to the Cheviots and Berwickshire District, by subtracting the mean northerly and westerly components from those of each station separately.

These values (n' and w') are shown in the next Table, together with the angle between the local Horizontal Disturbing Force and the geographical meridian. Jedburgh and Kelso, which are too much involved in the disturbed ground to be included in the list from which the mean disturbance was found, are treated in the same way.

	n.	w.	n'.	w'.	ϕ'.
Greenlaw	+ 14	+20	− 24	+14	+150
Earlston	+ 11	0	− 27	− 6	−167
Selkirk	+ 70	− 5	+ 32	−11	− 18
Hawick	+ 63	− 3	+ 25	− 9	− 20
Riccarton Junction	+ 19	+ 6	− 19	0	±180
Harbottle	+ 80	−12	+ 42	−18	− 23
Alnwick	+ 12	+15	− 26	+ 9	+161
Wooler	+ 34	+28	− 4	+22	+101
Mean	+ 38	+ 6			
Jedburgh	+ 63	−29	+ 25	−35	− 55
Kelso	−162	+79	−200	+73	+160

The result, shown graphically in Map 14, is that a distinct attraction towards the Cheviots is exhibited at the five stations nearest to them.

Riccarton Junction and Alnwick, distant about 10 and 12 miles respectively from the crystalline rocks, are apparently outside the range of their influence. Hawick, Selkirk, and Earlston, are affected, rather by the ridge line which runs from the igneous centre westwards, than by the visible basic rocks themselves.

Considering how small the second residuals are, the largest northerly and westerly disturbances (apart from Jedburgh and Kelso) being 0·00042 and 0·00022 C.G.S. unit only, we think the result very satisfactory.

Galway.

We have observed at six stations close to the borders of the igneous and gneissic rocks in Galway. They are Clifden, Ballinahinch, Maum Bridge, Oughterard, Galway and Spiddle. At Galway itself we confine ourselves for the present purpose to the result obtained at a station close to but not on the granite. Spiddle on the other hand is on the granite, and therefore hardly falls within the rule we are following. As, however, it is upon the coast, we include it in Map 14.

At all six stations the Horizontal Disturbing Forces point to the crystalline rocks, among which there are many basic intrusions.

The attractions apparently exerted in the North of England and in Galway by rocks, which, taken as a whole, are but feebly magnetic, are, we believe, capable of an explanation quite in accord with the recent tendency of opinion among geologists. It is thought that in many cases the fluid magma out of which the rocks were formed was arranged in layers of various densities, the lighter non-basic materials floating on the heavier and more magnetic constituents. Where such a separation occurred a group of non-susceptible rocks would now stand upon a magnetic foundation. It is conceivable that investigations, such as our own, may help to determine where this is the case.

Faults.

It appears at first sight that the magnet would be affected if a fault in the superficial strata extends down to magnetic rocks.

There are, however, a number of arguments which show that no noticeable disturbance might be produced.

If the depth at which the magnetic rocks occur is, say, four or five times the throw of the fault, the magnetic effects would in general be very small.

Even when this is not the case, the possible effects are more complicated than would at first be supposed. If the magnetic rocks form a horizontal slab, the Vertical Force due to the horizontal faces will be positive above the mass, but negative at parts near to but not over it. The positive or negative Forces may be strengthened or may not be affected by the vertical face, according as the latter is perpendicular to the magnetic meridian and to the south of the slab, perpendicular to the magnetic meridian and to the north of the slab, or in the magnetic meridian.

The Horizontal Disturbing Forces in such a case will not be directed to the fault, but to the centre of the mass of which it makes the boundary.

According to Sir ARCHIBALD GEIKIE, however ('Encycl. Brit.,' Ed. IX., vol. 10, p. 261), a fault or dislocation is nearly always inclined to the vertical.

If the basaltic slab, which is assumed to underlie it, were not horizontal, the effects of the fault itself would be interfered with and marked by the Disturbances due to the approach of the mass towards the surface.

There is, therefore, no *à priori* reason for supposing that a fault must coincide with a line of attraction.

If it does, it will be rather a proof of a favourable conformation of hidden magnetic rocks than an illustration of a general principle. Thus, two stations at Bewdley on either side of the well-known fault, which runs from that place towards Malvern, do not appear to be affected by it.

In Scotland and the North of Ireland, however, some of the magnetic ridge lines, if not coincident with, are for some distance parallel to important faults. This is true of the Great Glen (Caledonian Canal), of the fault which crosses Scotland from the Clyde to Stonehaven,* and of the fault which runs south-west from Antrim.

These facts are sufficiently illustrated on Map 14.

The magnetic observations tend to show that the fault line of the Great Glen is prolonged northwards, but, on the other hand, the extension of the fault southwards by Loch Swilly to Donegal Bay is not indicated by the magnet, or is masked by the neighbourhood of the Antrim and Donegal basic rocks.

A magnetic ridge line runs close to the South Highland fault for about 60 miles. It appears, however, to cross it near its northern boundary and does not follow its prolongation south-west towards Donegal Bay.

The Galloway ridge line runs for some distance nearly parallel to, though at an average distance of some 20 miles from, the fault which bounds the Mid-Scotland District on the south.

For the rest, there does not seem to be any very close connection between the geology of Scotland and the other magnetic ridge lines in that country.

Regions of Upheaval.

If it be true that magnetic ridge lines sometimes indicate the physical ridge lines of underground magnetic masses, it seems probable that there would be a connection between them, and an anticlinal arrangement of the surface strata. It is evident, however, that in this case, also, it is difficult to decide upon what we ought *à priori* to expect.

No one, whose knowledge of the geology of the London basin was confined to the surface only, would suspect the existence of the Palæozoic ridge upon which it rests. It is quite possible that similar elevations of the assumed deep-lying magnetic rocks may be unsuspected by geologists, but may be detected through all the intervening strata by the magnet. Again, in Mid-Scotland and elsewhere, vast masses of basalt on the surface are associated with rocks newer than those which bound them both to the north and south.

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* This fact has been established by our later observations. (See "1890 Memoir," p. 318.)

If the newer rocks hid the basalt a magnetic ridge line would appear to be associated with a synclinal axis. Anomalies are, therefore, to be expected, and we propose to bring together the cases in which our results, when interpreted on the magnetic rock theory, are in accord or in disagreement with surface indications, not so much with the intention of supporting the view to which, on the whole, we incline, as of collecting in a convenient form the arguments which may be adduced for or against it.

The facts are clearly set forth in Map 14. The colouring of the map is explained in it. As the groups into which the strata are divided do not, except in the case of basic rocks, coincide with the main Geological divisions, the ordinary colours used in geological maps have not been adopted except for the basic rocks.

To distinguish magnetic ridge lines from dykes the former are indicated by crosses.

The magnetic indications appear to be quite independent of the disposition of the newer strata.

The Weald of Kent is a region of geological upheaval, but of low Vertical Magnetic Force. On the other hand, a magnetic ridge line runs across the geological depressions in North Yorkshire.

Again: the well-marked ridge line which runs from near Reading to Chichester, has no apparent connection with the superficial geology.

Among the more ancient rocks the lower Carboniferous strata in Devonshire lie between the older Silurian and Devonian formations, but a ridge line traverses it right across the county.

This is, however, almost the only exception, in England and Wales, to the rule that in the case of rocks older than the coal measures there is an approximate agreement between regions of geological upheaval and of high Magnetic Vertical Force.

This is true of the Mendip Hills.

The line which runs through South Wales and Gloucestershire towards Reading, ranges from Pembrokeshire, where the older Palæozoic rocks are mingled with trap, through a region in which the Palæozoic rocks are probably not far below the surface.

It may mark a line along which the older Palæozoics are ranged, though covered unconformably by newer Palæozoic rocks.

The line in Mid-Wales and Shropshire is for some miles parallel to the fault which runs from the Wrekin to Radnor. It starts where the Builth igneous rocks are exposed, runs by Wenlock Edge and the Wrekin—where again there is a mass of trap—and then passes direct from the older rocks in this neighbourhood towards those of Derbyshire. It certainly suggests an underground connection between them.

Another ridge line connects the Nuneaton and Dudley Coal Fields which rise in the midst of newer rocks. The southward prolongation of this line towards Reading does not correspond with any surface indications. A slightly marked line, which is probably connected with this, runs north-east from Lichfield to Nottingham, passing through the patch of older rocks which occurs to the north of Charnwood Forest.

To the east of Reading the more southerly of the two ridge lines coincides roughly with the line of the Palæozoic ridge, but it is rather to the south of the points in which the oldest rocks probably approach nearest to the surface. The more northerly line passes through Ware, near which Silurian rocks have been proved.

In the north of England the magnet is attracted to a line which roughly follows the axis of greatest geological elevation from the Lake District to Harrogate, and thence southwards through Derbyshire. A branch traverses the Lancashire Coal Field, which projects like a promontory among later formations.

This concludes the evidence that there is a certain though somewhat loose connection between ridge lines in England and regions of upheaval of the older rocks.

The Derbyshire and the Yorkshire magnetic ridges are obviously prolonged under the newer strata in the East Midland and Eastern Counties. The latter line especially passes close to Market Weighton, where the Jurassic rocks thin out, and which was recommended as a station by Professor JUDD on account of the probability of the older rocks approaching the surface there. In South-East Lincolnshire folds in the new strata have recently been discovered, which run parallel to our ridge line, and may be connected with more deeply-seated undulations.

In Scotland the magnetic lines appear to be chiefly associated with the basaltic masses and the faults. These have been already discussed.

In Ireland a ridge line is associated with a succession of Silurian masses, which lie between newer rocks, and are marked by the Galtee, Silvermine, and Slieve Bloom Mountains respectively.

It is connected with a slightly marked ridge line, which appears to be a continuation of the Palæozoic ridge, and with others which run to the igneous rocks of Connemara and of South Down. From Connemara the ridge is continued north-east parallel to the Silurian ridges and to the faults which occur in this part of the country.

On the whole then it appears that the connection between the magnetic ridge lines and the geological conformation of the country, though in some cases clearly suggested, is only such as would follow if the magnetic effects were due to deep-seated folds in the magnetic rocks, which are not always directly connected with the arrangement of the surface rocks.

The general results may be summed up as follows :—

(1.) Theory leads us to expect, and experiment shows that dykes and thin basaltic sheets produce no measurable Disturbances at distances which are small multiples of their thickness.

(2.) Theory leads us to expect, and experiment shows that masses of trap rock, a few square miles in area, produce no noticeable magnetic effects at distances comparable with their linear dimensions.

(3.) Theory leads us to expect that the effects of faults would be irregular. They would only correspond to ridge lines in special cases. There may be large positive or negative Vertical Forces in their neighbourhood. If the fault is inclined at a considerable angle to the vertical, or if the depth of the magnetic rocks is four or five times the throw, little or no effect will be produced.

Experiment shows that ridge lines are certainly associated with the great faults in Scotland and with a fault in Ireland, but that there is no clear connection between them elsewhere.

(4.) Large masses of basalt, such as those which occur in Skye, Mull, Antrim, the Scotch Coal Field, and North Wales, are always centres of attraction.

(5.) Non-basic igneous rocks often produce little or no effect, but sometimes, and notably in the cases of Connemara and of the Cheviots and Berwickshire District, they are centres of attraction. In both these regions basic rocks occur.

(6.) In no case does a large igneous mass repel the north pole of the needle. The only case in which the suspicion of such repulsion could arise is that of the Wicklow Mountains, and the facts would there be equally well explained by supposing the magnetic effects of the granite to be negligible.

(7.) The magnetic ridge lines often occur in districts where there are no magnetic rocks on the surface. They appear to be unaffected by the distribution of surface rocks of later date than the coal measures, but there are a number of cases in which they are associated with an anticlinal arrangement of the older rocks. To this the lower Carboniferous formation of Devonshire is an exception.

The sixth of these conclusions is of great theoretical importance. If the rocks are magnetized by induction they would attract the north pole of the needle. If they merely deflected earth currents, there seems to be no reason why the eddies thus produced should always circulate in the same direction, which would be necessary if they were the cause of the attraction which is always in play in the neighbourhood of the rocks.

FUTURE APPLICATIONS OF THE RESULTS OF THE SURVEY.

The positions of the isomagnetic lines in the future may be calculated by means of Tables XIV., XX., XXI., and XXII. If the epoch for which they are to be determined is n years after January 1, 1891, the numbers in Table XIV. must be multiplied by $0{\cdot}2 \times n$ and added algebraically to the corresponding numbers in Tables XX., XXI., and XXII.

The values so obtained may be checked by deducing from them the values of the elements at the principal magnetic observatories and comparing them with those given by experiment.

As regards the ridge lines, we believe that our survey affords a basis by means of

MAP 1.

Isogonals.

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Isogonals.

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MAP 2.

Lines of Equal Horizontal Force.

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MAP 3.

Isoclinals.

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MAP 4.

Principal Regions of Magnetic Attraction.

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MAP 5.

Declinations and True Isogonals.

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Map 6.

Horizontal Forces and True Lines of Equal Horizontal Force.

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MAP 7.

Dips and True Isoclinals.

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MAP 8.

Vertical Forces.

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MAP 9.

Declination Disturbances.

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MAP 9.

Declination Disturbances.

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MAP 10.

Horizontal Force Disturbances.

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MAP 11.

Dip Disturbances.

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MAP 12.

Vertical Force Disturbances.

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MAP 13.

Magnetic Disturbing Forces.

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MAP 14.

Relation Between Magnetic and Geological Features.

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